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ABSTRACT

This is the first of three volumes of a safety guide developed to assist Kansas administrators and teachers in organizing, evaluating, and maintaining safety programs. It provides information to help them identify, assess, and correct unsafe conditions relating to equipment and facilities and ensure a safe and healthy environment for themselves and students. The guide delineates areas to be considered in designing effective, ongoing safety awareness programs and provides technical information regarding the systematic development of those programs. Instruments for self-evaluation, reporting, and record keeping are included for assessment purposes. This volume addresses these topics: (1) program responsibility; (2) liability; (3) special education; (4) emergency action, medical first aid, and accident reporting; and (5) safety rules by curriculum areas. Curriculum areas covered include elementary education laboratory experiences; art education; home economics education; industrial education; language arts-drama; physical education, intramurals, and athletics; and science education. (YLB)

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KANSAS

SAFETY EDUCATION HANDBOOK

Volume 1

DEPARTMENT OF THE
EDUCATION, KANSAS
NATIONAL INSTITUTE OF
EDUCATION

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Kansas State Department of Education
In Cooperation with the
Wichita Public Schools, U.S.D. 259
Wichita, Kansas



CE 02881

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THE ENEMY

I am more powerful than the combined armies in the world. I have destroyed more men than all the wars of all nations. I massacre thousands of people every year. I am more deadly than bullets, and I have wrecked more homes than a cabal of the world's most sensuous women.

In the United States alone, I steal over \$500 million each year. I spare no one, and find victims among the rich and poor alike, the young and old, the strong and weak. Widows know me to their everlasting sorrow. I loom up in such proportions that I cast my shadow over every field of labor.

I lurk in unseen places and do most of my work silently. You are warned against me, yet, you heed me not. I am relentless, merciless and cruel. I am everywhere--in the home, on the streets, in the factory, at railroad crossings, on land, in the air, and on the sea.

I bring sickness, degradation, and death, yet few seek me out to destroy me. I crush, I maim, I will give you nothing and I may rob you of everything you have.

I am your worst enemy. I am CARELESSNESS!

(author unknown)

SAFETY CREED

WE BELIEVE . . .

. . . that every man bears the unalterable responsibility for keeping out of harm's way. This he owes to himself, his family, his fellows and his job.

. . . that no man lives or works entirely alone. He is involved with all men, touched by their accomplishments, marked by their failures. If he fails the man beside him, he fails himself, and will share the burden of that loss. The true horror of an accident is the realization that a man has failed himself — and more — that his fellows have failed him.

. . . that accidents are conceived in improper attitudes, and born in moments of action without thought. They will cease to be only when the proper attitude is strong enough to precede the act — when the right attitude creates the awareness that controls the act.

. . . that the prevention of accidents is an objective which crosses all levels of rank, organization and procedure.

. . . that freedom from harm is not a privilege but a goal to be achieved and perpetuated day by day.

. . . that the elimination of injury and pain through accidents is a moral obligation upon which the final measure of our performance directly depends.

—American Society of Safety Engineers, GREATER CHICAGO CHAPTER

FOREWORD

The purpose of this safety guide is to provide a resource of measures for ensuring safe and healthy educational and work environments for Kansas pupils. The guide has been developed to assist school staffs to identify, assess, and correct safety and health hazards through implementation of comprehensive safety awareness programs. This document delineates those areas to be considered in designing effective, ongoing safety awareness programs and provides technical information regarding the systematic development of those programs. Instruments for self evaluation, reporting, and record keeping are included for assessment purposes.

It is our belief that the use of the measures outlined in this document will assist in making Kansas schools safer places to work and learn. The final result should be a reduction in the number of school-related injuries.

The State Board of Education and its Department of Education are grateful to Smiley Ebert, Director of Industrial Arts, Wichita Public Schools, for his foresight in recognizing the need for this document, the comprehensiveness of his planning, and the efforts expended in the completion of this document.

Merle R. Bolton
Commissioner of Education
Kansas State Department
of Education

WICHITA PUBLIC SCHOOLS

Unified School District No. 259
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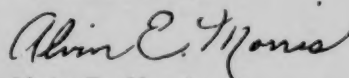
Dear Kansas Educator:

The Wichita Public Schools have been privileged to work with the Kansas State Department of Education to author and publish the KANSAS SAFETY EDUCATION HANDBOOK. Teachers and school officials not only within a district but within the state now have access to detailed safety programs.

Under the direction of personnel in the Curriculum Services Division, writing teams selected from Wichita teachers highlighted possible hazards to which pupils and teachers are exposed in each curriculum area. They enumerated safety practices and procedures to alleviate these recognized dangers. School supervisors and craftspersons outlined risk areas in school facilities and emphasized standards and regulations governing such facilities. These teams worked diligently to prepare a cohesive safety plan as documented by this publication. The writers not only maintained their busy daily schedules, but added many extra hours to that schedule to provide this material. We are grateful to them for their contributions to the safety and welfare of pupils and all school personnel.

We hope that the KANSAS SAFETY EDUCATION HANDBOOK will be implemented in each Kansas school to provide this much needed facet of education. We sincerely hope that it will be used by each teacher, administrator, craftsperson, and other school personnel to make a concerted effort in reducing accidents and to teach safety education.

Sincerely yours,



Alvin E. Morris
Superintendent of Schools

U. S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
216 North Waco, Suite B

Wichita, Kansas 67202

REPLY TO
ATTN OF: Jeff C. Spahn, Area Director
SUBJECT: Kansas Safety Awareness Handbook



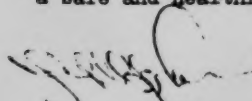
TO: Mr. C. Smiley Ebert
Director, Industrial Arts Vocational
Technical Center

The thrust and intent of the Occupational Safety and Health Act of 1970 has historically been directed toward achieving voluntary compliance. While a number of options are available in promoting that goal, including a viable and active enforcement program, education and training are critical to the program success.

By recognizing the need for safety and health awareness training, the school districts will enhance public awareness of the enormous costs, both human and monetary associated with industrial accidents and illness.

In advocating hazard recognition in the school system a safer more healthful Kansas workforce is a future certainty.

This Area Office is responsible for administering the Occupational Safety and Health Act throughout the State of Kansas. We look forward to continuing cooperation with the school districts in achieving a safe and healthful workplace.


JEFF C. SPAHN
Area Director



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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Mr. C. Smiley Ebert
Wichita Public Schools
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Vocational-Technical Center
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Wichita, Kansas 67211

Dear Mr. Ebert:

I recently had the opportunity to review the introduction and table of contents of your proposed Kansas Safety Awareness Handbook which is about to be published. I wish to commend you for your effort. The Division of Training and Manpower Development of the National Institute for Occupational Safety and Health (NIOSH) has developed and promoted jointly with CS³ a training program for science teachers throughout the U.S. on good work practices in the school science laboratory. A similar joint OSHA-NIOSH effort is about to take place in training industrial arts and vocational education teachers and administrators.

Reducing illness and injury to American workers will result in great part through participation by management and labor in programs designed to improve safety and health in the workplace. I firmly believe that teachers and school administrators represent the greatest opportunity to influence the thinking of potential workers by providing instruction to teachers and through them and the teaching methodology to the student. It is my belief that your publication is definitely a positive step in promoting safe and healthful conditions for all people in the Kansas Educational System.

Sincerely,

Norbert J. Berberich, Ph.D.
Chief, Curriculum Development Branch
Division of Training and Manpower
Development

Dear Kansas Educator:

The Industrial Safety Section, Kansas Department of Human Resources under the mandate of KSA-44-636-637 has the jurisdictional responsibility for safety and health in all facilities occupied and/or under the control of state and municipal governments including school districts.

The agency as a matter of routine conducts safety and health inspections and issues written recommendations relative to violations observed which could cause bodily injury or health problems.

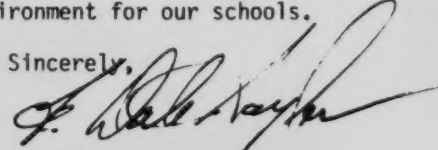
The recommendations are, as a matter of convenience, referenced to OSHA standards. However, the OSHA standards are condensed from numerous standards long utilized by the State of Kansas including those of National Fire Protection Association (NFPA), the American National Standards Institute (ANSI), and the National Electrical Code (NEC).

In addition to inspection the agency also provides the following aid and assistance at no charge:

1. Safety and health seminars covering a variety of subjects for state, municipal and school personnel.
2. Specific technical safety and health information including on-site consultations.

We shall welcome opportunities to work with you in behalf of our mutual commitment to a safe and healthful environment for our schools.

Sincerely,



F. Dale Sayler, Chief
Industrial Safety Section
Department of Human Resources

K.S.A. 44-636

SECTION 1. K.S.A. 1977 Supp. 44-636 is hereby amended to read as follows: 44-636. (a) The secretary of human resources shall have power to enter any factory or mill, workshop, private works, public works or state agency or institution, mercantile establishment, laundry or any other place of business where labor is or is intended to be performed for any purpose, when the same are open or in operation, for the purpose of gathering facts and statistics such as are contemplated by this act, and to examine into the methods of protection from danger to employees and the sanitary conditions in and around such buildings and places and to keep a record thereof of such inspection.

If it shall be found upon such investigation that the heating, lighting, ventilation, occupant capacity or sanitary arrangement of any such establishment or place is such as to be injurious to the health of persons employed or residing therein, or that the means of egress in case of fire or other disaster are not sufficient, or that the belting, shafting, gearing, elevators, drums, saws, cogs or machinery, in any such establishment or place are so located or are in a condition so as to be dangerous, or are not sufficiently guarded, or that the vats, pans or any other structures filled with molten metal, hot liquid or hazardous materials or substances are not surrounded with proper safeguards for preventing accidents, injury or illness to those persons in, or near them, or that the construction or condition of any building or buildings, or any boiler, machinery or other appurtenances in or about any place as described in this section is such as to be dangerous or injurious to the persons employed or residing therein, or that the methods of operation are such as to be unnecessarily dangerous or injurious to the persons employed or residing therein, or that any other condition which is within the control of the owner, proprietor, agent, administrator or lessee of any such building, establishment or place to be found to be dangerous or injurious to any persons employed therein or to any other person or persons, the secretary or the authorized agent of the secretary after making such inspection shall notify in writing the owner, proprietor, agent, administrator or lessee of such building, establishment, or place. Such notification may also include an order that requires the provisions of such safeguards or safety devices or the making of such alterations or additions or changes in methods of operation or the taking of any other measures the secretary may deem appropriate and necessary for the safety and protection of the employees or other persons endangered by such conditions and the amount of time granted by the secretary for making any such alterations, additions, changes or taking such other methods as required. Such amount of time shall not exceed sixty (60) days after service of the notice and the order unless an extension thereof

is requested for good cause shown by the person named in the order, and such extension is granted by the secretary.

(b) The notification required by subsection (a) shall include notice of the right to a hearing concerning any order included therein. Any such order shall become final unless within thirty (30) days after service of the notice and order, the person or persons named therein shall request in writing a hearing by the secretary. If a request is made for a hearing the secretary shall notify the person or persons involved of the date of the hearing which shall not be more than thirty (30) days after such request is made. If, after hearing, or if a hearing is not requested within thirty (30) days after service of the notice and order, the secretary finds that actions specified in the order may be deemed reasonable and appropriate, the secretary shall affirm the original order. If the secretary finds such actions not to be appropriate, the secretary shall notify or rescind the original order. If the secretary affirms, modifies or rescinds the original order, the secretary shall notify the person named therein of such action.

(c) No person, firm or corporation, nor any officer, agent or employee thereof, shall remove or require to be removed, or made ineffective any practical safeguard around or safety attachment to any machinery, vats, pan, or other apparatus or device mentioned in this section while the same is in use, except for the purpose of immediately making repairs thereto, and all safeguards or safety attachments so removed shall be promptly replaced before the said dangerous machine, apparatus or device is returned to normal use or operation. Except as otherwise provided, no person shall require or permit the operation of, or operate, the dangerous machine, apparatus or device without the required safeguards or safety attachments.

(d) If the secretary of human resources determines that conditions or products in any place of employment are such that a danger exists which could reasonably be expected to cause death or serious physical harm immediately, or before such danger can be eliminated through the enforcement provisions otherwise provided by law, the secretary may order the immediate taking of any steps necessary to avoid, correct or remove such imminent danger and prohibit the employment or presence of any individual in locations or under conditions where such imminent danger exists, except individuals whose presence is necessary to avoid, correct or remove such imminent danger or to prevent any avoidable loss of production facilities or product.

(e) Upon issuance of the order authorized by subsection (d) of this section and upon the request of any party who is adversely affected thereby, the secretary shall fix a place and time for a hearing to be held on such order. Such hearing shall be held not more than twenty-four (24) hours after the request for the hearing. Not later than twenty-four (24) hours after the commencement of such hearing, the secretary shall reaffirm, modify or rescind such order on the basis of information and testimony presented at the hearing. The secretary shall notify the person named in the order of the decision of the secretary.

(f) No person shall discharge or in any manner discriminate against any employee because such employee has filed a complaint with, or fur-

nished information to, the secretary of human resources concerning conditions or situations alleged to be unsafe or hazardous or otherwise covered by the provisions of this act.

(g) Any person who willfully violates any provision of this section or any lawful order issued pursuant to this section shall be guilty of a misdemeanor and shall be subject to a fine of not less than twenty-five dollars (\$25) nor more than one hundred dollars (\$100). Each day that said violation exists shall constitute a separate offense.

(h) An action brought pursuant to this section shall not constitute a bar to enforcement of the provisions of this section by injunction or other appropriate remedy, and upon request of the secretary of human resources, the attorney general shall have the power to institute and maintain in the name of the state any and all appropriate enforcement procedures.

SECTION 2. K.S.A. 1977 Supp. 44-637 is hereby amended to read as follows: 44-637. As used in this act: (a) "Person" means an individual, corporation, partnership, company, agency, institution or association. (b) "Children" means minor persons under the age of fourteen (14) years. (c) "Minor" means a person under the age of eighteen (18) years. (d) "Factory" means any premises where steam, water or other mechanical power is used in aid of any manufacturing process. (e) "Workshop" means any premises, room, or place, not being a factory as above defined, wherein any manual labor is being performed, and to which or over which premises, room or place the employer of the person or persons working therein has the right of access or control. (f) "Public works" means any agency of state government and its political subdivisions and municipalities including schools, counties, and cities. The exercise of manual labor in a private house, or a private room, by the family dwelling therein, or by any of them, or in case a majority of persons therein employed are members of such family, shall not of itself constitute such house or room a workshop within this definition.

ACKNOWLEDGMENTS

The KANSAS SAFETY EDUCATION HANDBOOK is a cooperative curriculum effort between the Kansas State Department of Education and the Wichita Public School System. The following is a list of contributors who have been instrumental in the development of this Handbook. It is impossible to adequately describe the extent and value of each individual effort put forth to successfully complete this material. It is hoped that those listed here are aware of the sincere appreciation felt for their endeavors and their concern for the health and safety of the pupils and school personnel.

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INTRODUCTION

As educators, we have a most important responsibility--that of preparing youth for roles of adulthood. We need to ready them so that they may function in and contribute to the adult world; a transition from simulation to application. Our pupils must not only achieve an academic and technical background that will lead them to future employment, but they must benefit from an emphasis on safety education. This will enable them to function in many diversified fields--school, business or industry, and home--without threat of bodily harm.

Educators have always been aware of their responsibility and concerned for the health and well-being of their pupils. They have maintained a high standard of safety education and conveyed this standard to their pupils. However, various factors have unintentionally hindered educational safety programs. Federal and state laws, as well as additional safety requirements enacted by business, industry, and education, have imposed obligations of such magnitude that even the most idealistic educator finds it difficult to maintain and know each precept that would contribute to providing pupils with a safe place in which to learn and live, and the employee a better place in which to work.

Safety education cannot be compromised and must be an inherent part of each pupil's education and each teacher's responsibility. Recent surveys by the U.S. Department of Health, Education, and Welfare report that 6 million pupils, teachers, staff members, and visitors are injured in the nation's schools and universities each year; costing nearly 25 million days of restricted activity, and over 4 million days of paid disability. As a result of these injuries, almost 1.5 million days are lost from work, and over 3.5 million days are lost from school. What happens to these pupils after their formal education ends? How do they react to the hazards prevalent in industry and business?

Current business and industrial statistics indicate that in the last year work accidents caused approximately 13,300 deaths; 2,300,000 disabling injuries; and 80,000 permanent impairment cases. Wage losses, medical expenses, and insurance settlements amounted to \$20.7 billion. According to NIOSH representatives, the majority of these accidents happened to employees within their first three years of employment. These statistics support the evidence that employees have limited backgrounds in safety education.

Home accidents resulted in 24,000 deaths or 11.1 deaths per 100,000 persons. Disabling injuries numbered 3.6 million, and less-

serious injuries totaled 20 million--all occurred within the home. These deaths and disabling injuries cost at least \$6.6 billion. The cost figure includes wage loss, medical expense, health insurance administration cost, and fire loss.

The nation's schools have a direct responsibility for providing a safety program, integrated into all curriculum areas, that will supply the current data that pupils need to keep them from being casualties in the home, business, and industrial world. However, before safety practices for these areas can be taught, the school environment must be evaluated.

Litigation against school systems and school personnel is becoming a growing and fertile business. In fact, according to a recent Kansas State Supreme Court ruling, municipalities are no longer exempt from tort liability. This decision can certainly reflect on public schools, employees, and officers.

In order to support educators and to help improve and standardize their safety programs, the Kansas State Department of Education and the Wichita Public Schools combined efforts to produce the KANSAS SAFETY EDUCATION HANDBOOK. The Handbook is based upon selected OSHA (Occupational Safety and Health Act) and NIOSH (National Institute for Occupational Safety and Health) standards that pertain to the school system. By blending these standards with accepted and proven safety practices, we feel that we have designed a viable base for schools within the state.

The KANSAS SAFETY EDUCATION HANDBOOK provides information for administrators and teachers so they may organize, evaluate, and maintain safety programs; recognize unsafe conditions relating to their equipment and facilities; and ensure a safe and healthy environment for themselves and their pupils.

C. Smiley Ebert,
Project Director

RESPONSIBILITY FOR THE SAFETY PROGRAM

STATE DEPARTMENT OF EDUCATION

Recognizing that safety education is an important component of most vocational and general education curricular programs, the state department of education is committed to providing special technical assistance to school staffs in integrating safety concepts in their curricular programs and in the construction or remodeling of school facilities. This assistance is available through the agency's education program specialists, who are assigned to curricular and other technical assistance areas. The services of these specialists are available upon request to school staffs throughout the state and include provision of consultative help, inservice education, and informational material.

SCHOOL DISTRICT: BOARD OF EDUCATION MEMBERS

The district school board has the legal authority and moral responsibility to provide and maintain a safe place for pupils and staff while they are participating in educational activities. The board also assures a sound safety program that will provide pupils with a knowledge of safety when pursuing their livelihood. Safety education is assured by board members through the control of district policy, curriculum, personnel, and budget.

SUPERINTENDENT

The superintendent makes recommendations to the Board of Education through his/her own initiative and after consideration of the requests or recommendations of other educators. Under the direction of the board, the superintendent will provide the leadership for implementing and adhering to board requests. Delegation of authority to accomplish the mission of the board is given by the superintendent to management personnel.

DISTRICT ADMINISTRATORS

District administrators have the responsibility for providing a district organization that will initiate, implement, and evaluate a unified safety program. The program must be based on the standards

acceptable to business, industry, and the community, while also providing educators with the latitude to develop safety materials germane to their educational setting. District administrators are also responsible for establishing a communication system that will inform teachers and administrators of new standards, procedures, and policies. They must also provide inservice education prior to the establishment of standards within the school system.

PRINCIPALS

The individual school is the central unit of an educational enterprise. Therefore, the building principal is likely to be the administrator who is most directly concerned with, and responsible for, that school's safety program. The principal works cooperatively with district administrators and the teachers within the school to promote a safety-conscious attitude in all phases of the school's operation to establish a safety education program in all departments, to assure compliance with local and state regulations, and to set budget priorities that will accomplish the given task.

TEACHERS

In a school system, the major responsibility for a viable safety program lies with the teacher. The teacher, in cooperation with the administrators of the school system, must execute the recommendations of the administration for incorporating and improving safety instruction in the courses of study. Documentation must be maintained as to who received instruction, and when the instruction was given. Safe working conditions and practices must be maintained in the classroom. When needed, the teacher will recommend needed safety improvements to the school's administration. Teachers must avail themselves of inservice training for the purpose of keeping current on the latest safety practices in industry and education. These practices must then be applied to the classroom; through instruction to the pupils, and by the practical application of the teacher in setting a good example.

LIABILITY

STATE LAW AND ITS EFFECT UPON LOCAL SCHOOL DISTRICTS

July 1, 1979 is the date that Kansas changed laws that governed governmental immunity to a law that provides that an injured person could have limited rights of recovery against a governmental entity. Kansas Statutes Annotated (KSA) 75-61 became effective on this date and is known as the Kansas Tort Claims Act. Prior to this time school districts were immuned by KSA 46-901 and 46-902 (repealed July 1, 1979) unless the school district purchased liability insurance and thereby waived immunity (KSA 72-8408 repealed July 1, 1979). The statute specified that a school district could incur liability only to the extent of the limits of the liability insurance purchased (KSA 72-8411 repealed July 1, 1979.)

The doctrine of governmental immunity came to the United States from England where it was established in the middle ages. Kansas adopted the doctrine in the 1800's and has maintained the principle until the legislature passed the Kansas Tort Claims Act in 1979.

Correl v. The City of Parsons, Kansas is the landmark case in Kansas in which it was decreed: "that the rule that a municipality is not liable for the negligent act of its officers and employees in the performance of a governmental function should be abolished. It does not promote justice, and serves no rational purpose."

The Kansas Tort Claims Act provides that each governmental entity shall be liable for damages caused by the negligent or wrongful act or omission of any of its employees while acting within the scope of their employment. The Act also provides that the governmental entity shall provide for the defense of the employee and that the entity shall not be liable for claims in excess of \$500,000, nor liable for punitive damages.

The change in the law will have great impact upon school districts and employees. They should have been operating in the past in safe manners, teaching safe operation of equipment, providing safe equipment, meeting safety standards in building construction, providing adequate supervision, and all other areas of safety for pupils and the general public. Now as the private sector has had to do, school districts will be called upon to prove that they are not acting in a negligent manner in court. Those who have not been acting prudently will pay cost.

INSURANCE

The School district should provide for insuring against the possibility of litigation on claims made against the school district, board members, and/or employees. The school district can provide for these possibilities by: (1) transferring the risk to an insurance company, (2) joining an insurance pool with other municipalities, or (3) self-insuring.

When purchasing insurance the school district will normally purchase a general liability policy that will cover bodily injury, property damages, personal injury, and possible medical payments for all operations of the school district. For vehicles the insurance policy will cover bodily injury, property damage, and medical payments. If pupil or school patron automobiles are used in an automotive training program, it should also include the various garage liability coverages. The other major area to be protected is errors and omission. This coverage is generally called "School District Legal Liability Insurance." It will provide coverage for claims for other than physical injuries to persons or property. Another coverage that could possibly be needed is for any aircraft or aviation exposure.

Basic liability policies contain limitations, exclusions, and policy requirements. Many of these may be modified, waived or changed. The policy will not cover all operations unless so endorsed. Care should be taken to have full understanding of the coverage purchased.

If a school district chooses to self-insure, then the district should properly fund the program to handle claims, legal defense, safety inspections, and judgments. To self-insure and not fund a program could lead to serious budgetary and financial problems. If a school district chooses to enter into a pooling arrangement with other municipalities, it will require study and provisions for funding a pool.

With the recent United States Supreme Court decision stripping immunity from prosecution in claims for violation of civil rights, school districts need to make provisions for protection. General liability policies do not provide coverage in the area. School district legal liability policies in many cases exclude this coverage. It is possible to negotiate with an insurance carrier to waive the exclusion or in some cases to modify the exclusion. The decision was a federal decision, and what limitation the Kansas Tort Claims Act will have on civil rights actions is questionable.

TORT LIABILITY COURT FINDINGS

In order to see how courts are responding to claims of negligence the following is a review of cases against schools and employees.

In *MOORE v. ORDER MINOR CONVENTUALS*, 267 F.2d 296 (4th Cir. 1959), a fifteen year old boy in first year chemistry was given permission to go to the lab to set up an experiment to be made later in that day. He was unaccompanied by any supervisory personnel. He, with other boys, and using materials from an unlocked cabinet, attempted to make ordinary gunpowder. Although unsupervised, the court held that the boy was barred recovery by virtue of contributory negligence, as a matter of law. The boy, in testifying, admitted that his purpose was to create an explosion.

In *NOLAND v. COLORADO SCHOOL OF TRADES, INC.*, 153 Colo. 357, 386 P.2d 358 (1963), the pupil was injured in a gunsmithing class and recovered a judgment against the school when the pupil's teacher had been unsuccessful in removing a lead slug from the barrel of a gun, handed the gun to the pupil and instructed him to shake as much gun powder out of the barrel as was possible, and to remove the slug by tapping it out. While the pupil was following his teacher's instructions, the gun powder exploded, propelling the slug into the pupil. The appellant court held that the trial court had erred by directing a verdict in favor of the teacher, by virtue of the fact that there was ample evidence upon which the jury might find that the teacher was negligent in handing the gun to the pupil.

In *KIRCHNER v. YALE UNIVERSITY*, 150 Conn. 623, 192 A.2d 641 (1963), the school failed to warn and instruct a pupil regarding the safe operation of a jointer in the woodworking shop. The pupil was an architectural pupil, making a model for his class, and was injured when a piece of wood on the jointer kicked back as he was pushing it over the blade. Likewise, the appellant court held that the trial court had committed error in directing a verdict in favor of the school board.

In *MILLER v. MACALESTER COLLEGE*, 262 Minn. 418, 115 N.W. 2d 666 (1962), the school was held liable when the pupil was injured by a scaffold that tipped over as the pupil was removing certain lighting fixtures, at the direction of the teacher, in a drama class production. With respect to supervision, the court said that the teacher in charge of the activity had the duty of exercising reasonable care in inspecting the scaffold to learn if it was safe, in determining the proper method of assembling it, and ascertaining a safe method to be followed in the work to be performed with it. It is felt that the same would be true as to the operation of machinery or equipment in a science or shop setting.

In *BRIGHAM YOUNG UNIVERSITY v. LILLYWHITE*, 118 F.2d 836, 10th Cir. 1941, Cert. Den. 314 U.S. 628, the court held the university liable when inexperienced pupils in the chemistry class were permitted to proceed with an experiment in the teacher's absence from the room. An explosion ensued. It was the policy of the school to require supervision during the conduct of a chemistry experiment.

TEACHER NEGLIGENCE

At a recent NIOSH workshop, a summary of a dissertation by Mr. Harvey Barrett of the Virginia Technical Institute was presented. Based upon teacher responses to questionnaires disseminated by Mr. Barrett, it was reported that the major areas that resulted in judgments against the teachers and large settlements (in and out of courts) for pupils were:

THE TEACHER FAILED TO:

1. Explain basic safety procedures.
2. Warn of possible dangers.
3. Anticipate unsafe events.
4. Exercise reasonable care--example: providing labeling.
5. Provide proper supervision to pupils in the selection and handling of hazardous materials.
6. See that pupils use safety equipment--example: safety glasses, hard hats, etc.
7. Insist on the use of safety guards.
8. Use a supplemental safety textbook.

LOCAL BOARD OF EDUCATION POLICIES

The school district should adopt Board of Education policies that establish safety guidelines in safety practices for pupils, staff, and patrons as priority. The following are some sample policies in the safety areas and are categorized under four classifications:

A. ADMINISTRATION

1. Bomb Threat
2. Civil Preparedness
3. Fire Safety
4. Responsibility of School Personnel for Pupils Enroute to and from School
5. Safety Responsibilities
6. School Safety Patrols
7. Tornado Drills
8. Weather Warning

B. CURRICULUM

1. Accidents Involving Driver Education Vehicles
2. Construction and Launching of Model Rockets
3. Program and Safety Responsibilities for Driver Education II
4. Safety, Art Education Laboratories
5. Safety, Eye Protective Devices for Industrial Education
6. Safety, Industrial Education Laboratories
7. Safety on Stages

C. HEALTH SERVICES

Care of Medical Emergencies

D. SCHOOL PLANT PLANNING AND OPERATION

1. Safety, Shelter Areas During Natural Disasters
2. School Bus, Safety and Discipline
3. Use of Electrical Equipment Near Swimming Pools
4. Working Situations

ADMINISTRATION: BOMB THREAT

BOARD POLICY:

ANONYMOUS TELEPHONE CALLS OR NOTES CONCERNING THE PLANTING OF A BOMB IN A BUILDING OR THE DISCOVERY OF A SUSPICIOUS ARTICLE SHOULD BE REPORTED IMMEDIATELY TO THE LAW ENFORCEMENT AUTHORITY HAVING JURISDICTION, SCHOOL SYSTEM RADIO DISPATCHER, AND THE SUPERINTENDENT OF SCHOOLS BY THE PRINCIPAL OR DESIGNEE, NONUNIFORMED PERSONNEL WILL BE DISPATCHED TO AID IN THE SEARCH AND INVESTIGATION.

Administrative Implemental Procedures:

Each school or building shall have the following bomb threat operating plan:

1. Receiving the Bomb Threat

- a. The person receiving the bomb threat message will notify the principal or designee who will notify:
 - (1) The law enforcement dispatcher, giving all pertinent information including who is to be contacted at the building and where each may be found
 - (2) School system radio dispatcher
 - (3) The Superintendent of Schools
- b. A tape recording of a bomb threat telephone message should be made whenever possible.
- c. Prepare the bomb threat form provided by the Wichita Police Department.

2. The Search Plan

- a. Immediately after the threat has been received, the search plan will be put into effect.
- b. The search should be made without the pupils' knowledge that something unusual is happening.
- c. Law enforcement personnel will arrive at the building in unmarked vehicles and in plain clothes. They will assist in coordinating the search and request any additional assistance necessary from special squads.

- d. Personnel from various Plant Facilities crafts will be dispatched to the area if their assistance is needed. They will contact the building principal, designee, or the police office in charge to obtain instructions on procedures for assisting in searching, disconnecting equipment, etc.
 - e. No radio transmissions shall be made in the immediate vicinity of the building.
 - f. Designated personnel, administrators, custodians, security, and selected staff will be assigned building areas to search.
3. Suspicious Articles
- a. Normally, any suspicious article should not be touched.
 - b. Only authorized personnel from the law enforcement authority will inspect or remove suspicious articles.
4. Evacuation and Emergency Closing
- a. When there is sufficient evidence that a suspicious article or a suspected bomb has been placed or located in the building, the principal or designee shall evacuate the immediate area or the total building by appropriate means.
 - b. In the event that the search and investigation warrant the temporary closing of a building, the policy entitled "Emergency Closing of Schools" and related policies and procedures should be followed.
5. Notification When Building is Considered Safe
- a. Law enforcement staff will coordinate with the building principal or designee regarding notification when a building is considered safe.
 - b. The principal or designee shall notify the School System Radio Dispatcher when the building is considered safe.
 - c. The principal or designee shall notify the Superintendent's office when the building is considered safe.

ADMINISTRATION: CIVIL PREPAREDNESS

BOARD POLICY:

IT IS THE POLICY OF THE WICHITA PUBLIC SCHOOL SYSTEM FOR THE PRINCIPAL TO DISMISS ALL PUPILS AND PERSONNEL IN CASE OF A NUCLEAR ATTACK WARNING.

Administrative Implemental Procedures:

1. Employees, parents, and pupils in the building should be notified that all building personnel will be dismissed immediately after the principal receives official notice of a nuclear attack warning.
2. All building administrators will give proper attention to the provisions of this policy at least annually.
3. Official notice of a nuclear attack warning will come through the community alarm system or from the Superintendent through the Telephone Committee.

ADMINISTRATION: FIRE SAFETY

BOARD POLICY:

PRINCIPALS ARE CHARGED WITH THE RESPONSIBILITY FOR A FIRE-SAFETY EDUCATION PROGRAM AND FOR SPECIFIC DETAILS IN THE ORGANIZATION AND IMPLEMENTATION OF A FIRE-SAFETY PROGRAM.

Administrative Implemental Procedures:

1. State law requires the following in all schools:

Conduct a fire drill at least once a month. (State Law 72-4606 and 31-208) Post in obvious locations the time for evacuating the building for a fire drill each month. (Forms furnished by the State Fire Marshal) The form is to be mailed to the State Fire Marshal's office at the close of the school year.

2. Cooperate with local fire officials in fire and safety programs and yearly inspection of the building by the Fire Department.
3. Instruct the staff to post in each classroom the routes used for a fire drill.
4. Store combustible liquids in metal containers.
5. Instruct and direct the custodian in the following duties:
 - a. Check fire alarm daily and record results in logbook.
 - b. Visually inspect all fire extinguishers monthly.
 - c. Inspect all panic bars regularly. Chains or other means of thwarting operation of panic devices should not be used without permission of the Fire Department.
 - d. Check exit lights daily to see that they are on and working.
 - e. Store oily rags or combustible materials in covered metal containers.
 - f. Battery-powered emergency lights are to be check regularly and properly maintained.

ADMINISTRATION: SAFETY RESPONSIBILITIES

BOARD POLICY:

BUILDING PRINCIPALS, STAFF ADMINISTRATORS, AND PLANT FACILITIES PERSONNEL ARE PRIMARILY RESPONSIBLE, WITHIN THE LIMITS IMPOSED BY AVAILABLE RESOURCES, FOR INITIATING AND MAINTAINING THE NECESSARY PRECAUTIONS FOR THE HEALTH AND SAFETY OF THE STAFF AND PUPILS IN THE SCHOOL SYSTEM AND FOR COMPLIANCE WITH THE RULES, REGULATIONS, AND LAWS GOVERNING HEALTH AND SAFETY.

Administrative Implemental Procedures:

1. Safety education, as implemented in various curriculum areas, is the responsibility of each building principal, curriculum area supervisor, and classroom teacher.
 - a. Building principal
 - (1) The building principal is responsible for a comprehensive safety education program in the building.
 - (2) The building principal shall monitor implementation of safety education measures.
 - b. Curriculum area supervisors
 - (1) The curriculum area supervisor will provide principals and teachers with guidelines describing safety procedures in the various curriculum areas.
 - (2) The curriculum area supervisor, with teacher participation, is responsible for designing and implementing instructional programs in safety in his/her area of expertise.
 - c. Classroom teachers
 - (1) The classroom teacher is responsible for obeying all safety policies and for establishing and maintaining the practice of good safety techniques in all instructional activities.

- (2) The classroom teacher is responsible for providing safety instruction for all pupils in the use and proper handling of equipment and materials. The teacher is to instruct each pupil in approved safety procedures as established by the curriculum area supervisor before authorizing pupils to use potentially hazardous equipment and materials.
2. Safety inspection of the facilities, equipment, and materials is the responsibility of the building principal and curriculum area supervisors.
 - a. Building principal

The building principal is responsible for the overall safety inspection of the building. The building principal or designee shall conduct an inspection of the physical facilities, equipment, and materials in the building at least annually. A safety inspection checklist shall be completed. One copy of the safety inspection checklist shall be submitted to the division director's office, one copy shall be submitted to the Plant Facilities Special Services Coordinator, and one copy shall be filed in the principal's office.
 - b. Curriculum area supervisor

The curriculum area supervisor is responsible for evaluating the facilities of his/her curriculum area in each secondary school. An annual inspection of facilities, equipment, and materials shall be completed by the curriculum supervisor or designee. A safety inspection checklist shall be completed and submitted to the building principal, with copies to the teacher, the Plant Facilities Special Services Coordinator, and the Director of Curriculum Services Division.

The Director of Curriculum Services Division will assist the Director of Elementary Education and the Director of Secondary Education in establishing priorities for budgeting to correct hazardous and unhealthful conditions listed on the safety inspection checklist recommendation sheet.
3. Safety and health conditions relating to buildings and equipment are the responsibility of each building administrator, curriculum area supervisor, and Plant Facilities administrator and supervisor.

- a. Extremely hazardous and unhealthful conditions requiring immediate attention should be reported by calling the order desk at the School Service Center. Plant Facilities personnel will assign the highest priority for immediate correction of the hazard. If the condition is noted on the safety inspection checklist recommendation sheet, in addition to the phone call, a written request form shall be submitted to the Plant Facilities Special Services Coordinator.
 - b. Hazardous and unhealthful conditions not requiring immediate attention shall be identified by the building principal or curriculum area supervisor. A written request form for alteration to the building or site, service, or safety shall be submitted to the Plant Facilities Special Services Coordinator. Long-range planning requirements should be structured into Plant Facilities budget proposals for future funding. If the condition is noted on the safety inspection checklist recommendation sheet, a written request form for each item that requires external service to correct the condition shall be submitted to the Plant Facilities Special Services Coordinator.
- 4. Authority for operation and supervision of activities and functions concerned with the health and safety of staff and pupils may be delegated to other staff members, who shall be responsible to the principal, curriculum area supervisor, Plant Facilities administrator or supervisor.
 - 5. The Deputy Superintendent is assigned the overall supervision for health and safety responsibilities, as well as fixing the responsibility for the implementation of rules, regulations, and laws governing health and safety.
 - 6. All accidents involving school employees and/or pupils are to be reported on the proper forms within 24 hours to the Risk Management Coordinator by the administrator or immediate supervisor who has primary responsibility for that site.
 - a. The Risk Management Coordinator shall file a report of the accident with the State Department of Health or the State Director of Worker's Compensation, as required by law or as otherwise appropriate.
 - b. The Risk Management Coordinator shall forward a copy of the accident report to the division director, departmental director, or curriculum area supervisor for the purpose of taking immediate action toward the unsafe condition, if any.

- c. The Risk Management Coordinator will make an evaluation of the accident with the help of the building administrator and the appropriate curriculum area supervisor, or Plant Facilities supervisor. In all cases, the accident should be reviewed with the employee. The result of this investigation will be shared with the Director of Vocational and Continuing Education Division, the Director of Secondary Education, or the Director of Elementary Education, whichever is appropriate.

**ADMINISTRATION: RESPONSIBILITY OF SCHOOL PERSONNEL FOR
PUPILS ENROUTE TO AND FROM SCHOOL**

BOARD POLICY:

SCHOOL PERSONNEL COOPERATE WITH PARENTS AND CIVIL AUTHORITIES TO MAINTAIN PROPER PUPIL CONDUCT AND ENSURE THE SAFETY OF PUPILS; HOWEVER, THEY ARE NEITHER LEGALLY LIABLE NOR LEGALLY RESPONSIBLE FOR PUPILS ENROUTE TO AND FROM SCHOOL IF THE PUPILS WALK OR FURNISH THEIR OWN TRANSPORTATION. BOARD POLICIES RELATING TO BUS TRANSPORTATION ARE APPLICABLE WHILE PUPILS ARE UNDER THE SUPERVISION OF A SCHOOL BUS DRIVER.

Administrative Implemental Procedures:

1. School personnel teach pedestrian and bicycle safety and work to gain the cooperation of pupils in observing safety rules while riding bicycles or walking to school.
2. The community should be informed concerning the school's safety program.
3. The principal, staff, and the safety chairperson of the Parent-Teacher Association, or other community group, cooperate in promoting safety for all pupils.
4. Pupil Safety Patrols may be utilized to provide safety at selected crossings.
5. High school principals are authorized to impose fines in order to enforce vehicular traffic and parking. (See policy entitled "Pupil Vehicles - Fines.")

ADMINISTRATION: SAFETY, SCHOOL SAFETY PATROLS

BOARD POLICY:

ESTABLISHMENT AND OPERATION OF SCHOOL SAFETY PATROLS ARE THE RESPONSIBILITY OF THE PRINCIPAL. THE OPERATION OF A PATROL HAS AS ITS PRIME PURPOSE THE SAFETY OF CHILDREN. A PATROL'S ULTIMATE GOAL SHOULD BE SAFETY EDUCATION RATHER THAN SAFETY ENFORCEMENT.

Administrative Implemental Procedures:

1. School safety patrols are used at crossings adjacent to the school building and at other locations when unusual situations require placing patrols at greater distances from the building.
2. Selection and training of patrol members and operation of school patrols should be carried out in accordance with Wichita Police Department policies, state statutes and their interpretations, and School Traffic Safety Policies and Procedures.
3. A form issued by the Police Department requiring parents' signatures serves as a waiver to release boys and girls for Junior Traffic Patrol Service.
4. Periodic evaluation of the operation and accomplishments of the patrol is essential.
5. Pupils selected to serve on school patrols might be congratulated on their appointment by letter. The safety patrol sponsor should acquaint patrol members with rules, responsibilities, duty schedules, and other pertinent information.
6. Ceremonial functions such as beginning the school year, meetings, and recognition awards should be conducted in a manner that lends dignity, a sense of responsibility, and respect of peers to the patrol members.
7. Any changes in traffic patterns or controls that might endanger children should be reported to proper city and school system authorities.

ADMINISTRATION: TORNADO DRILLS

BOARD POLICY:

THE PRINCIPAL OF EACH SCHOOL SHALL BE RESPONSIBLE FOR CONDUCTING A TORNADO DRILL, OR OTHER ACTIVITIES APPROPRIATE TO PREPARE PUPILS TO DEAL WITH TORNADO EMERGENCIES, AT LEAST THREE TIMES DURING A SCHOOL YEAR,

Administrative Implemental Procedures:

1. One tornado drill should be conducted during the fall, the time of the second will be left to the discretion of the building principal, and a third required drill shall be conducted in April.
2. The drill held in April should be conducted in cooperation with the county-wide tornado drill organized annually by Sedgwick County Civil Preparedness. Details for this drill will be provided to principals by the Deputy Superintendent of Schools.
3. Tornado drills will be reported following their completion on the drill report form provided by the State Fire Marshal. The form is to be mailed to the State Fire Marshal's office at the close of the school year.
4. The precise nature of the drill will be determined primarily by the unique structural conditions and availability of safe shelter areas in the building. In some isolated situations, a carefully planned instructional briefing might be preferable to an actual simulation.
5. Other specific procedures for a simulation drill are contained in the policy entitled Weather Warning.
6. Since there are normally no all-clear signals following drills, pupils may return to their classes when the principal is satisfied that teachers have pupils properly sheltered and/or positioned.
7. In the event pupils are on school buses during a tornado warning, bus drivers have been advised by the bus contractor that the following steps are to be taken:

- a. If a tornado warning has been given prior to the departure of a bus from school premises, drivers are instructed not to leave the school with the pupils; instead, the driver is to escort the pupils back into the school or a designated shelter area.
- b. If warning sirens are sounded while the bus is transporting pupils, the drivers are instructed to stop the bus at the nearest shelter and escort the pupils to shelter.
- c. In the event a driver escorts pupils to a shelter area, the driver shall assume responsibility for notifying the principal or secretary of the school the pupils attend who, in turn, will notify key parents regarding the pupils' whereabouts.
- d. Principals of the schools designated as tornado shelters shall instruct custodians and other personnel likely to be in a building following the dismissal of school to aid drivers and pupils seeking shelter in the building.

ADMINISTRATION: WEATHER WARNING

BOARD POLICY:

THE BUILDING PRINCIPAL IS AUTHORIZED TO CARRY OUT PROCEDURES MOST SUITABLE TO THE BUILDING FOR THE PROTECTION OF PUPILS AND SCHOOL PERSONNEL IN CASE OF AN IMPENDING STORM. SINCE EACH PLANT FACILITY IS UNIQUE IN DESIGN AND LOCATION, GENERAL PROCEDURES SHOULD BE ADAPTED TO MEET THESE UNIQUE CONDITIONS.

Administrative Implemental Procedures:

1. Principals are encouraged to consult the Director of Plant Facilities and/or the building architect in order to ascertain which building areas would offer greatest security in the event of a severe storm. In the absence of unique circumstances, the following guidelines should generally be followed:
 - a. Pupils in portables should be moved to permanent buildings.
 - b. Best protection is near inner walls on the lower floors away from windows. Some classroom windows, opposite the storm, should be open to equalize atmospheric pressure. Auditoriums and multipurpose rooms should be avoided.
 - c. In the event that no adequate security can be provided on the school campus, principals may work out evacuation plans which utilize other nearby facilities.
 - d. Authority for early dismissal of school must come from the central office.
2. Building personnel should monitor radio or television reports regarding a possible severe thunderstorm or tornado watch if a storm appears imminent.
3. The Parent-Teacher Association Safety Chairman or another key person may be instructed to call the building if either event occurs. Others should be discouraged from calling the building.
4. A severe thunderstorm or tornado watch does not require evacuation of classrooms or mass movement of pupils. It is intended to alert personnel to a possible need for emergency action.

5. A tornado warning indicates than an actual sighting of a tornado funnel has occurred. Principals must respond to a tornado warning by taking immediate steps to move pupils and staff members to places of shelter.
6. In the event of a tornado warning, pupils are to remain in the building unless called for by an authorized adult. In cases such as this, the principal should encourage the adult to remain with the pupil in the school shelter area until the "All Clear" is announced.
7. In the event that a tornado warning is in effect, persons in places of shelter shall remain until an all-clear signal is received. The all-clear message may consist of a news media announcement or telephone notification in the event that the dispatcher at Plant Facilities is informed.

CURRICULUM: ACCIDENTS INVOLVING DRIVER EDUCATION VEHICLES

BOARD POLICY:

SCHOOL EMPLOYEES SHALL MEET LEGAL REQUIREMENTS RELATED TO ACCIDENTS INVOLVING DRIVER EDUCATION VEHICLES.

Administrative Implemental Procedures:

1. Responsibilities of the driver education teacher
 - a. The teacher shall not leave the scene of the accident until obligations set forth in Kansas law and in this policy are fulfilled.
 - b. If there is an injury or property damage over three hundred dollars (\$300) the teacher shall notify police of the accident and cooperate with the officers in making the necessary investigation and report. (The police department is responsible for reporting the accident to the State Department of Revenue, Division of Vehicles.)
 - c. If the accident is a non-injury accident and property damage is less than three hundred dollars (\$300) no report must be made to the police. However, the teacher shall exchange necessary information with the other party involved in the accident. He/she shall avoid committing the Board of Education regarding insurance liabilities.
 - d. The teacher shall notify the high school principal of the accident and report the damages or injuries.
 - e. In case of serious injury, the teacher shall call an ambulance. If there is injury or an indication of injury, communication with the pupil's parents is essential. An injured pupil shall not be permitted to leave the scene of the accident unaccompanied.
 - f. The Vehicle Accident Information Form, located in each driver education practice vehicle, is to be completed at the time of the accident. Information included in this form must be in agreement with the police report.
 - g. Upon return to the high school, the teacher shall report the accident to the Director of Industrial Arts/Driver Education.

h. Within 24 hours after the accident, the teacher will obtain an estimate of damages from the local franchise dealer from which the vehicle is leased. He/She shall then submit the Vehicle Accident Information Form, a simple diagram of the location of the accident showing positions of the vehicles involved, and the estimate of repairs to the Director of Industrial Arts/Driver Education.

2. Responsibilities of the Director of Industrial Arts/Driver Education

- a. After notification of the accident, the Director will inform the franchise dealer from whom the vehicle was obtained.
- b. The Director will file the accident report and the estimate of damages with the Coordinator of Risk Management.
- c. The Director will coordinate the efforts of the franchise dealer and the school to replace or repair the damaged vehicle.

3. Responsibilities of the Coordinator of Risk Management

The Coordinator of Risk Management will be responsible for effecting a commensurate settlement between the insurance company and the franchise dealer from whom the vehicle was obtained.

CURRICULUM: CONSTRUCTION AND LAUNCHING OF MODEL ROCKETS

BOARD POLICY:

MODEL ROCKETS MAY BE DESIGNED, CONSTRUCTED, AND LAUNCHED BY INDUSTRIAL ARTS PUPILS IF THE MODEL IS AN ESSENTIAL ASPECT OF THE CURRICULUM DESIGN.

Administrative Implemental Procedures:

1. Permission to launch model rockets has been granted by the Federal Aviation Administration and the Chief Fire Marshal, City of Wichita, Kansas, provided there is strict adherence to the following:
 - a. All rules described in the Code for Model Rocketry 1968-NFPA No. 41L, written by the National Fire Protection Association, must be observed.
 - b. The teacher of the class must submit to the City Fire Marshal previous notice of the time and location of each launching.
 - c. Flight areas shall be located in areas that will not create a hazard to persons and property in the vicinity of the launching.
 - d. Rockets are to be designed and constructed to meet the following specifications:
 - (1) Rockets are not to exceed a ceiling of 300 feet.
 - (2) Rocket engines are not to exceed a propellant weight of 0.200 ounces.
 - (3) Only a commercially manufactured, solid propellant rocket engine in which ingredients of a combustible nature are preloaded may be used.
 - (4) Body of rocket shall be constructed of wood, plastics, paper, rubber, or similar materials and without any metal structural parts.
 - (5) A model rocket shall not contain any type of explosive or pyrotechnic warhead.
 - e. Rockets are to be launched only by a remote electrical device; between launchings, the teacher shall disconnect battery leads.

CURRICULUM: PROGRAM AND SAFETY REQUIREMENTS
FOR DRIVER EDUCATION II

BOARD POLICY:

THE ADVANCE PROGRAM IN DRIVER EDUCATION, INVOLVING TRAINING IN THE USE OF MOTORCYCLES AND ADVANCED AUTOMOBILE DRIVING SKILLS, SHALL MEET ALL PROGRAM AND SAFETY STANDARDS AS OUTLINED BY THE KANSAS STATE DEPARTMENT OF EDUCATION AND THE BOARD OF EDUCATION.

Administrative Implemental Procedures:

All schools offering an advanced driver education program shall be under existing regulations for beginning driver education with the following additions:

1. Motorcycle Education

- a. All programs shall be approved by the State Department of Education.
- b. Motorcycle instruction shall be offered only to pupils who are sixteen (16) years or older, who have completed an approved course in driver education or hold a valid operator's license.
- c. Each course shall contain a minimum of twenty-four (24) hours of instruction including an average of not less than six (6) hours of on-street, behind-the-bar instruction per pupil.
- d. A teacher shall have no more than six (6) student drivers under his/her direction during on-street instruction.
- e. All pupils participating in behind-the-bar, on-street instruction shall wear a safety vest of bright orange, red, or yellow with the words "Student Driver" on the back.
- f. Pupils shall not ride a motorcycle on the range, dirt tract, or a public road without proper supervision and in compliance with the state law of Kansas and the city ordinance of Wichita.
- g. All motorcyclists shall wear helmets at all times while riding motorcycles. Each helmet shall meet state and federal safety regulations.

- h. All motorcyclists shall wear eye protective devices, such as visors, at all times while riding motorcycles on the public roads and dirt track. Each eye protective device shall meet state and federal safety regulations.

2. Advanced Driving Skills

- a. All programs shall be approved by the State Department of Education.
- b. Advanced driving skills shall be offered only to pupils who are sixteen (16) years or older, who hold a valid operator's license, and/or who have completed an approved basic driver education program.

CURRICULUM: SAFETY, ART EDUCATION LABORATORIES

BOARD POLICY:

ART LABORATORIES SHALL BE EQUIPPED WITH SAFETY DEVICES AND ALL PRECAUTIONS SHALL BE TAKEN TO MAINTAIN AND PROTECT THE HEALTH AND WELFARE OF PUPILS. THE ADMINISTRATION SHALL INITIATE ACTIVITIES TO IMPLEMENT SAFETY STANDARDS.

Administrative Implemental Procedures:

1. The Director of Art will initiate Requests for Maintenance and cooperate with Plant Facilities personnel to rectify any safety problem in Art Education Laboratories in the secondary schools.
2. Safety guard devices shall be used on all circular saws, grinders, polishing wheels, pug mills, radial arm saws, planers, jointers, and any other power tools for which a safety device has been designated and accepted as standard.
3. All exposed drive belts on air compressors and power tools must be covered with appropriate safety guards.
4. Centrifugal casting machines shall have protective shields surrounding machine.
5. No pupil will be allowed to work with molten metals unless protected with asbestos gloves and face shield.
6. No pupil will be allowed to work with grinders, polishing wheels, or hot metals without eye-protective devices.
7. Installation of kilns in school buildings
 - a. Kilns shall be provided with 3 feet clearance from combustible material on all sides and a clear area above kiln to ceiling; except, that a noncombustible wall of masonry can be used in lieu of 3 feet clearance on sides.
 - b. Kilns shall be installed on noncombustible base (masonry or 1/4 inch asbestos).
 - c. Electric kilns shall be provided with a cone shutoff control.
 - d. Gas kilns shall be equipped with an automatic shutoff control (photo electric cell).

- e. Kiln shall be operated only during school hours.
 - f. Pupils shall not operate kilns.
 - g. Kilns shall be disconnected (if plug-in type) or shut off at breaker (if connected directly). In the case of gas-fired kilns, an in-line gas cock shall be provided within one foot of kiln.
 - h. Under no circumstances shall combustible material be allowed on the kiln inside the 3-foot clearance area or between the noncombustible wall surrounding the kiln.
8. Storage of oxygen and acetylene gases shall be limited to two cylinders of each per laboratory and shall not be located less than twenty (20) feet from open flames, except in specifically approved storage facilities.
9. Installation of oxygen and acetylene manifolds and storage of compressed gases shall be completed by these recommendations:
- a. Oxygen-acetylene manifolds are to be located so that any combustible material, grease, or oil is at least twenty (20) feet away.
 - b. When special approved storage facilities are not used, the aggregate capacity of each manifold should be limited to six cylinders--three of oxygen and three of acetylene. No more than two cylinders of each are to be connected to the manifold, and one cylinder may be kept in storage at the same location. All cylinders are to be anchored securely.
 - c. Piping from cylinder hookup to welding area is to be of rigid iron or steel.
 - d. Flame arrester is to be located near cylinder hookup and shutoff valve is to be provided in each line near the welding area.
 - e. Each manifold supply is to be separated by at least twenty (20) feet, or, if located in the same area, be separated by brick or cinder block wall at least five (5) feet high.
10. The spraying of paint or other combustible materials must be done in laboratory areas that were designed and are approved for that purpose.

11. All paint and thinners shall be stored in an approved metal cabinet with doors.
12. Oily and soiled cloths will be contained in an approved flip-top waste can.
13. The instructor shall be responsible for teaching the safety rules for the handling of all tools in the laboratory prior to using the tools.
14. All furnished safety devices, protective apparel, etc., should be requested on the art education budget by the building departmental coordinator. His/Her request will be given high priority.

CURRICULUM: SAFETY, EYE-PROTECTIVE DEVICES FOR INDUSTRIAL
EDUCATION

BOARD POLICY:

IN ORDER TO PROVIDE FOR THE SAFETY AND WELL-BEING OF TEACHERS AND PUPILS IN INDUSTRIAL EDUCATION LABORATORIES, THEY SHALL BE REQUIRED TO WEAR APPROVED EYE-PROTECTIVE DEVICES WHEN PARTICIPATING IN CERTAIN CLASSES WHICH HAVE SUBSTANTIAL POTENTIAL TO INJURE EYES. (K.S.A. 72-5207)

Administrative Implemental Procedures:

1. Eye-protective devices will be required for pupils in industrial education laboratories involving experience with the following:
 - a. Hot molten metals, or other molten materials
 - b. Milling, sawing, turning, shaping, cutting, grinding, or stamping of any solid materials
 - c. Heat treatment, tempering, or kiln firing of any metal or other materials
 - d. Gas or electric arc welding, or other forms of welding processes
 - e. Repair or servicing of any vehicle
 - f. Caustic or explosive materials.
2. Eye-protective devices will meet the Z87.1-1968 standards of the United States of America standard safety code for occupational and educational face protection.
3. In all industrial education laboratories where eye-protective devices are furnished to the pupils
 - a. Such devices will be requested by industrial education building coordinators and included on the equipment budget. Requests for eye-protective devices shall be given the highest order of priority on the equipment budget.
 - b. Following the use of an eye-protective device by a pupil, the device will be sterilized in a germicidal cabinet prior to its use by a different pupil.

4. Each industrial education laboratory having eye-protective devices must be provided with a lens-cleaning station. Cleaning stations are to be requested on the industrial education equipment budget by the building departmental coordinator. This item will receive a high priority on the equipment budget.
5. Procedures for repair of broken eye-protective devices have been established and bulletins giving procedures have been published.

CURRICULUM: SAFETY, INDUSTRIAL EDUCATION LABORATORIES

BOARD POLICY:

LABORATORIES SHALL BE EQUIPPED WITH SAFETY DEVICES AND ALL PRECAUTIONS SHALL BE TAKEN TO MAINTAIN AND PROTECT THE HEALTH AND WELFARE OF INDUSTRIAL EDUCATION PUPILS. THE ADMINISTRATION SHALL INITIATE ACTIVITIES TO IMPLEMENT OCCUPATIONAL SAFETY AND HEALTH ACT STANDARDS, UNIFORM FIRE CODE, AND LIFE SAFETY CODE REQUIREMENTS PERTAINING TO INDUSTRIAL EDUCATION AS FUNDS PERMIT.

Administrative Implemental Procedures:

1. The Director of Industrial Arts or the Coordinator of Trade and Industry will initiate Requests for Maintenance and cooperate with Plant Facilities personnel to rectify any safety problem in the respective industrial education laboratories in the secondary schools.
2. Safety guard devices shall be used on all circular saws, radial arm saws, planers, jointers, and any other machine tools for which a safety device has been designated and accepted as standard.
3. All exposed drive belts on air compressors and machine tools must be covered with appropriate safety guards.
4. No pupil will be allowed to work with molten metals unless he/she is protected with asbestos gloves, asbestos knee leggings, asbestos apron, and face shield.
5. No pupil shall be allowed to work with hot metals without eye-protective devices.
6. The spraying of paint or other combustible materials must be done in laboratory areas that were designed and are approved for that purpose.
7. All gas-fired appliances, including heat-treating furnaces, foundry furnaces, and forge furnaces, shall be equipped with approved automatic safety devices.
8. Storage of compressed combustible gases, such as oxygen and acetylene, shall not be located less than twenty (20) feet from open flames, except in specifically approved storage facilities.
9. Storage of oxygen and acetylene gases shall be limited to two cylinders of each per laboratory unless manifold systems exist.

10. Installation of oxygen and acetylene manifolds and storage of compressed gases shall be completed by these recommendations:

- a. Oxygen-acetylene manifolds are to be located so that any combustible material, grease, or oil is at least twenty (20) feet away.
- b. When special approved storage facilities are not used, the aggregate capacity of each manifold should be limited to six (6) cylinders--three of oxygen and three of acetylene. No more than two cylinders of each are to be connected to the manifold, and one cylinder may be kept in storage at the same location. All cylinders are to be anchored securely.
- c. Piping from cylinder hookup to welding area is to be of rigid iron or steel.
- d. Flame arrester is to be located near cylinder hookup and shutoff valve is to be provided in each line near the welding area.
- e. Each manifold supply is to be separated by at least twenty (20) feet, or, if located in the same area, be separated by brick or cinder block wall at least five feet high.

11. All paint and thinners shall be stored in an approved metal cabinet with doors.

All liquids with low flash points shall be contained in metal containers with spring latch lids.

12. Oily and soiled wiping cloths will be contained in an approved flip-top waste can.

13. Sandals and other footwear that do not provide proper protective covering of the top of the foot shall not be worn in the laboratories where there is danger of hot, sharp, and heavy materials being dropped.

14. Pupils with long hair are required to contain their hair in hats or hairnets or fasten the hair securely in the back of the head when using machines having exposed revolving parts or when in close proximity to other pupils using such machines.

15. The teacher shall be responsible for teaching the safety rules for the handling of all machine tools in the laboratory prior to the pupil's using the machine tools. The pupil must successfully pass an objective test and show evidence of being knowledgeable of the safety rules prior to using the machine tools.
16. All furnished safety devices, protective apparel, etc., should be requested on the industrial education budget by the building department coordinator. The request will be given high priority.

CURRICULUM: SAFETY ON STAGES

BOARD POLICY:

ESTABLISHED SAFETY AND OPERATIONAL PROCEDURES, RULES, AND REGULATIONS WILL BE OBSERVED IN ALL ACTIVITIES USING SCHOOL STAGES AND STAGE EQUIPMENT.

Administrative Implemental Procedures:

1. Teachers will instruct pupils about the need for proper attitudes and in good safety practices regarding the usage of a stage and stage equipment.
2. Pupils will operate stage equipment only under qualified adult supervision.
3. Lights, props, et cetera, will not be added to or removed from battens and/or pipes without proper counterbalance. Changes in the weight of the batten load or the counterweight will be made under proper adult supervision. Inexperienced or lightweight personnel will not attempt to operate a counterweight.
4. Weights will be permanently removed only by Service Department personnel.
5. Adjustments to cables, ropes, et cetera, will not be made by pupils or certificated personnel. Only the Service Department will make needed changes.
6. Equipment that is defective, worn, or in need of repair will be reported to the principal. The principal will establish procedures for communicating the information to the Service Department.
7. Prohibition of the use of open flames on stages, as well as other fire regulations, will be strictly adhered to by all personnel.
8. The use on stage of electrical equipment will be in accordance with all existing code regulations.
9. Overdeck or floor areas above the stage will be free of loose items which could be kicked or dropped to the stage floor, thus causing property damage or physical injury.

10. A stage area should not be used as a walkway from one side of the building to another location in the building.
11. Major alterations to a stage or stage equipment will be made only with consent of the principal.
12. Extreme care should be taken to protect stage curtains, floors, and permanent equipment when pupils and teachers paint props or other stage equipment. Only tempera paint may be used in the stage area. When oil or rubber base paints are used, they will be used and stored away from the stage area.
13. Service Department personnel will make an annual inspection of all stage equipment and repair or replace items whenever the need is brought to their attention.
14. Requests for assistance from the Service Department will be telephoned to the order desk.

HEALTH SERVICES: CARE OF MEDICAL EMERGENCIES

BOARD POLICY:

SCHOOL PERSONNEL ARE RESPONSIBLE FOR THE EMERGENCY HANDLING OF PUPIL AND STAFF INJURIES AND SUDDEN ILLNESSES BUT ARE NOT RESPONSIBLE FOR SUBSEQUENT TREATMENT.

Administrative Implemental Procedures:

1. Emergency procedure information, signed by parent or guardian, should be available on pupil information forms maintained in the general school office, with a copy in the health room. Completed staff emergency information forms should also be maintained in the general school office and in the health room. This information will assist school personnel in reaching appropriate, responsible adults.
2. Procedural guidelines consistent with sound emergency practices will be followed:
 - a. School employees should be familiar with the Health Services Department's written procedures for Care of Emergencies. These are available in the school office and health room.
 - b. If, in the best judgment of school personnel, the medical emergency indicates immediate treatment, DO NOT LEAVE the person. Administer first aid to stop bleeding, restore breathing, and prevent shock. If possible send for help (rescue squad, ambulance, principal).
 - c. Notify the pupil's parents as soon as possible. Obtain from the parents their choice in determining what medical care facility, if necessary, is desired. There should be no delay in the actions required in 2 b above in attempting to notify the pupil's parents.
 - d. Stay with the pupil until the parent or other responsible adult assumes responsibility, whether that be at school or at the emergency room of a hospital.
3. The school's final responsibility has not been met until a written record of the incident has been recorded on the appropriate forms and the forms properly processed. Major medical emergencies should be reported by phone to the Health Services Office as soon as possible.

SCHOOL PLANT
PLANNING AND
OPERATION: SAFETY, SHELTER AREAS DURING NATURAL DISASTERS

BOARD POLICY:

THE PRINCIPAL OF THE BUILDING BEING USED AS A SHELTER IS RESPONSIBLE FOR THE MANAGEMENT OF THE BUILDING AND BOARD OF EDUCATION EQUIPMENT DURING THE PERIOD OF SUCH USE.

Administrative Implemental Procedures:

1. If the public schools are asked to provide shelters for natural disasters, the Director of School Plant Planning and Operation Services Division will inform the Superintendent of Schools of the request. On the Superintendent's direction, the Plant Facilities Department will notify principals and prepare the buildings for shelter purposes.
2. The Director of School Plant Planning and Operation Services Division (or the designee) will also act as a liaison official for the Wichita Public School System with the local American Red Cross disaster service and/or Office of Civil Preparedness.
3. Other administrative officials will be directed to assist a principal with the necessary arrangements to prepare shelter accommodations.
4. In times of disaster, school personnel will cooperate with the local American Red Cross staff in operating shelters.

SCHOOL PLANT PLANNING AND OPERATION: SCHOOL BUS, SAFETY AND DISCIPLINE

BOARD POLICY:

THE PRINCIPAL IS RESPONSIBLE FOR DEVELOPING PROCEDURES FOR MAINTAINING ACCEPTABLE PUPIL DISCIPLINE ON BUSES AND FOR IMPLEMENTING THE STATE SCHOOL REGULATIONS IN REGARD TO PUPIL TRANSPORTATION VIA A CHARTERED OR SCHOOL-OWNED BUS.

Administrative Implemental Procedures:

1. Bus drivers have delegated to them responsibility for maintaining proper discipline on their bus.
2. Pupil behavior problems which develop on the bus will be referred to the principal for disciplinary action.
3. The principal will counsel and work with pupils who have been referred by the driver in much the same way that he/she works with classroom referrals.
4. After the parents have been advised that a pupil has been a disciplinary problem on a bus, the principal may remove a pupil from the bus for a short period of time. If behavior problems persist, the principal may remove a pupil from the bus permanently. Parents are to be notified in writing and provided an opportunity for a hearing on the matter with the principal.
5. In general, the bus driver is not authorized to remove pupils from the bus; however, in serious circumstances when a pupil is endangering the safety of other riders, an offender may be ejected immediately. If such action is taken, the driver must notify parents or authorities.
6. The principal is responsible to inform pupils and parents of the following state school regulations which relate to bus safety and behavior:
 - a. The driver is in charge of the pupils and the bus. Pupils must obey the driver promptly and cheerfully.
 - b. Each pupil must be provided a seat assigned by the driver.
 - c. Pupils must be on time; the bus cannot wait for those who are tardy. Pupils must walk on far left side of road facing traffic when going to bus stop.

- d. Pupils must wait for the bus off the traveled portion of the road. Pupils should wait in an orderly manner.
 - e. Unnecessary conversation with the driver is prohibited. Pupils must not distract the driver's attention; their safety is in his/her hands.
 - f. Ordinary conversation is permitted on the bus; otherwise, classroom conduct is to be observed.
 - g. Pupils should assist in keeping buses clean and sanitary at all times.
 - h. Pupils must not at any time extend arms or head through bus windows.
 - i. Pupils must not try to get on or off the bus or move about within the bus while it is in motion.
 - j. When leaving bus, pupils must observe directions of driver. When crossing the road, pupils are advised to do so in front of the bus after making sure street is clear.
 - k. Any damage to a bus is to be reported immediately to the driver.
 - l. During inclement weather, pupils who ride buses are to listen to their home radio for information concerning bus operations.
 - m. Assessment of penalty for violating rules will be the principal's responsibility.
7. The services of the Transportation Specialist are available to the principal in resolving school-bus-related disciplinary problems. This individual, working within the authority of the principal, will provide assistance by working with individual cases, arranging for contacts with parents, and performing similar services.

SCHOOL PLANT
PLANNING AND

OPERATION: USE OF ELECTRICAL EQUIPMENT NEAR SWIMMING POOLS

BOARD POLICY:

SINCE THE OPERATION OF ELECTRICAL EQUIPMENT NEAR WATER CONSTITUTES A GRAVE SAFETY HAZARD, ELECTRICAL DEVICES SHOULD NOT BE USED NEAR SWIMMING POOLS UNLESS IT IS ABSOLUTELY NECESSARY. IN THE EVENT THAT ELECTRICAL DEVICES ARE USED NEAR SWIMMING POOLS, RIGID PROTECTIVE MEASURES MUST BE INSTITUTED.

Administrative Implemental Procedures:

1. All electrical equipment to be used near the pool must be equipped with a suitable ground wire.
2. Only properly insulated electrical equipment may be used around swimming pools.
3. All electrical devices which are used around the pool must receive frequent safety inspections by a qualified Board of Education Electrical Department employee.
4. Ground-fault equipment will be installed on all electrical circuits in swimming pool areas.
5. Electrical equipment must never be operated closer than ten feet from the pool.
6. The use of 110-volt powered underwater speakers and lights is strongly discouraged. Battery-operated equipment should be considered.
7. At events where electrical devices are to be used, operators of said equipment must receive instructions concerning the proper operation and use. The electrical equipment operators must not be participants in the event.
8. A qualified Board of Education electrician shall be on duty at all rehearsals and shows with arbitrary authority to correct any deficiencies concerning the electrical equipment.

SCHOOL PLANT PLANNING AND OPERATION: WORKING SITUATIONS

BOARD POLICY:

SUPERVISORS AND EMPLOYEES SHALL TAKE PRECAUTIONS TO ENSURE THAT ALL RECOGNIZABLE HAZARDS ARE IDENTIFIED AND INSTRUCTIONS GIVEN IN WORKING IN A SAFE MANNER AND WEARING CORRECT APPAREL. THE ADMINISTRATION SHALL INITIATE ACTIVITIES IN TRAINING, INSPECTIONS, SAFETY BULLETINS, AND OTHER MEASURES FOR THE PROTECTION OF ALL EMPLOYEES AND PUPILS OF THE SCHOOL DISTRICT,

Administrative Implemental Procedures:

1. The employer shall instruct each employee in recognition and avoidance of unsafe conditions and the regulations applicable to his/her work environment to eliminate any hazards.
2. The supervisor is responsible for requiring the wearing of appropriate personal protection equipment in all operations where there is an exposure to hazardous conditions.
3. Employees working in areas where there is a danger of head injury from impact or from falling or flying objects or from electrical shock and burn shall be protected by approved hard hats.
4. Employees shall be provided with eye, face, and body protection when machines or operation of machines present potential physical, chemical, or radiation hazards.
5. Employees required to handle or use harmful substances shall be instructed regarding the safe handling and be made aware of potential hazards, personal hygiene, and personal protective measures required.
6. The use of unsafe machinery, tools, or equipment is prohibited. Unsafe tools, materials, and equipments shall be identified by tagging or locking controls to render them inoperable or they shall be removed from service.
7. Employees are expected to dress in such a manner as to be appropriate for the job assignment for which they were hired.
8. Employees who wear their hair in long fashions are required to contain their hair in hats or hairnets when using machines having exposed revolving parts.
9. Equipment, machinery, tools, and vehicles shall be used in a safe manner following any manufacturer's regulatory guidelines or regulations for safe operation and use.

SPECIAL EDUCATION

The Education for All Handicapped Children Act (Public Law 94-142) specifies that comprehensive and appropriate services shall be available to handicapped school children within the United States. Section 504 of the Rehabilitation Act of 1973 further states that the quality of life for handicapped citizens, from birth till death, shall not be lessened solely because of a person's handicap. These phrases are provided with the intent of leading all who serve the goal of education for all children with the philosophic framework, that comprehensive planning for all children within the educational system, includes handicapped children as their needs are identified.

Planning for the handicapped needs to begin as early as the first time the learner is identified as handicapped. The intensity of the planning will vary directly as the intensity of the handicap. Therefore, the planning for the most severely handicapped should begin and continue on an intensive basis from very early in the child's educational life. The planning should begin, for the more mildly handicapped, at the time of identification, but more closely parallel the normal learner in the intensity and timing of the planning.

The intensity and frequency of the planning, for safety considerations within the educational system, also varied directly with the severity of the handicapping condition. The more severe the handicap of the learner, the more intense the safety planning for that learner.

For purposes of this discussion of safety and the handicapped learner, a set of constants will be assumed. These constants are as follows:

1. That the child's individual educational plan specifies appropriate goals and objectives for the handicapped learner.
2. That the child's handicapping conditions are clearly identified.
3. That the child's handicapping condition is well enough defined that matters of safety can be considered as appropriately written methods and materials aspects of the individual education plan.

4. That the child, himself/herself, and his/her parents and teachers are in agreement with educational goals and objectives.
5. That when necessary specialists (e.g. sheltered workshop personnel, motor therapist, vocational coordinator) are involved in the overall planning of the vocational program.
6. That proper evaluative data are available to the team which plans the pupil's educational program.

This format for discussion of safety and the handicapped learner shall be based on definitions as provided in the Education for All Handicapped Children Act, and approved within many of the states' State Plan. These definitions provide the educational planner with an overview of learners' capabilities. Following each definition shall be important aspects of safety that may be common to many of the learners within the classification and suggested methods which may serve educators.

EDUCABLE MENTALLY HANDICAPPED (E.M.H.)

A child who, because of retarded intellectual development as determined by non biased individual psychological evaluation, and identifiable discrepancies in adaptive behaviors, is incapable of being educated profitably and efficiently through ordinary classroom education, but who may be expected to benefit from Special Education instructional programs designed to promote economical usefulness and social adjustment.

SAFETY CONSIDERATIONS --This learner may:

1. Best learn safety through demonstration as opposed to lecture and testing procedures.
2. Best learn the danger indicators of machinery through demonstration rather than lecture.
3. Best work when other distractors are removed from the situation.
4. Learn well from peers.
5. Maintain information when taught in the classroom, at home, and on the vocational setting.
6. Be safest when frequently tested on items of safety.

7. Need assistance when selecting vocational choices which are realistic to projected vocational goals.
8. Necessitate non-reading safety signs and rules.

METHODS-- Approaches to teaching this learner may include:

1. Rote learning techniques.
2. Concrete learning experiences.
3. Consistent revalidation of knowledge of safety criteria.
4. Positive peer examples.
5. Comprehensive approaches from the regular educator, vocational educator, special educator, and parent.
6. Consideration and planning for "identifiable discrepancies in adaptive behaviors."
7. Understanding and agreement with established educational goals, and required safety rules to achieve those goals.

SOURCES OF ASSISTANCE--These sources include:

1. Individual educational plan.
2. Teacher(s).
3. Parents.
4. Association for Retarded Citizens.
5. Private agencies serving vocational needs of mentally handicapped citizens.
6. Division of Vocational Rehabilitation.
7. District office personnel.

LEARNING DISABLED (L.D.)

A child who has a disorder in one or more of the psychological processes involved in understanding or using language, written or spoken or comprehended, which disorder may manifest itself in limited ability to think, listen, speak, read, write, spell, or do mathematical

calculations. Such disorders include conditions as brain injury, minimal brain dysfunction, dyslexia and development aphasia. Such term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, emotional disturbance, or environmental disadvantage.

SAFETY CONSIDERATIONS-- This learner may:

1. Exhibit strengths in some aspects of learning and weaknesses in other aspects of learning. These differences could lead to paper and pencil verification of safe behaviors, and in actual practice, unsafe behaviors; or, inability to prove paper and pencil safety, and demonstrated verification of safe practices.
2. Learn best when "patterned" through safe practices sequences by the vocational educator, general education teacher, special education teacher, and parent.
3. Learn best when the educational setting is not fraught with distractions.
4. Require consistent reinforcement for positive learner behavior relevant to safety.
5. Need to be encouraged to ask questions and seek information relevant to safety.
6. Need assistance with learning safety systems and planning safety behavior.
7. Need assistance in order to organize patterns of work in a manner which leads to best safety efficiency.

METHODS-- The educator may use methods as:

1. Multi-sensory approaches.
2. Concrete learning experiences.
3. "Over teaching."
4. Task analysis systems.
5. Planned organization for the learner.
6. Hands-on activities.

SOURCES OF ASSISTANCE-- These sources include:

1. Individual educational plan.

2. General education teacher.
3. Special education teacher.
4. Parents.
5. Association for Children with Learning Disabilities.
6. District office specialists in learning disabilities.

PERSONAL SOCIAL ADJUSTMENT (P.S.A.)

A child who, because of social or emotional problems, is unable to make constructive use of school experiences and requires the provision of special education designed to promote educational growth and development. (NOTE: No personal social adjustment child may be excluded from school, Special Education programs, on the grounds of being so grossly handicapped as to make education non-feasible.)

SAFETY CONSIDERATIONS-- This learner may:

1. Be safest in situations that are highly structured.
2. Be safest when "other distracters" are removed from the work situation.
3. Be safest when peer models provide positive experiences.
4. Be safest when the safety information taught in the regular classroom is parallel to information taught in the special education classroom and those experienced at home.
5. Be safest when a situation is understood and agreed to by the learner.
6. Be safest when frequently tested and reinforced concerning safe learner behavior.
7. Be safest when full understanding of the consequences of unsafe behavior are known.

METHODS--Approaches to teaching this learner may include:

1. Clear understanding of reinforcement patterns.
2. Planned intervention to cope with social or emotional problems.

3. Reinforcement patterns established in all settings as consistent.
4. Consistent revalidation of ramifications of unsafe behavior.
5. Positive peer examples.
6. Comprehensive approaches from the regular educator, vocational educator, special educator, and parent.

SOURCES OF ASSISTANCE--These sources include:

1. Individual educational plan.
2. Teacher(s).
3. Parents.
4. District office personnel.

HEARING IMPAIRED (H.I.)

A child whose residual hearing is not sufficient to enable understanding of the spoken word and to develop language, thus causing deprivation in learning and communication. Or, a child who exhibits a hearing loss which prevents full awareness of environmental sounds and spoken language limiting normal language acquisition and learning achievement.

SAFETY CONSIDERATIONS-- This learner may:

1. Best learn safety through demonstration as opposed to lecture and testing procedures.
2. Best learn safety, and other procedures, when an interpreter is provided.
3. Best learn safety when patterning from positive peer models.
4. Be safest when the consequences of unsafe behavior are clearly pointed out and understood by the learner.
5. Be safest when instructions are available in clear, concise language--in writing and/or through an interpreter.
6. Be safest when safety materials are available to the special education teacher and parent, in order that they might reinforce safety rules to the learner.

METHODS-- Approaches to teaching this learner may include:

1. Availability of alternate communication systems(e.g. interpreter).
2. Consistent revalidation of safety criteria.
3. Positive peer examples.
4. Visual presentations in clear, concise language.
5. Clear understanding and agreement with educational goals and safety criteria to achieve those goals.

SOURCES OF ASSISTANCE--These sources include:

1. Individual educational plan.
2. Teacher(s).
3. Parents
4. Parents' Association for Hearing Impaired Children.
5. Division of Vocational Rehabilitation.
6. District office personnel.

VISUALLY IMPAIRED (V.I.)

A child whose visual impairment is such that the child cannot develop educational potential without special services and/or materials, and requires provision of special education designed to promote educational growth and development.

SAFETY CONSIDERATIONS--This learner may:

1. Best learn safety when the learning environment is clearly defined for the learner.
2. Best learn safety when assisted by another worker or peer.
3. Best learn safety when safety information is presented orally, or through alternate communication systems such as large print materials or Braille. (NOTE: Your district office personnel have the ability to seek special materials when adequate time is available.)

4. Necessitate safety items be available at the work site for constant reference.
5. Require hands-on teaching methods, fortified with clear oral presentations and appropriate visual or tactile presentations.

METHODS-- Approaches to teaching this learner may include:

1. Alternate communication systems to make best use of tactile and/or visual abilities.
2. Hands-on learning experiences.
3. Positive peer examples.
4. Consistent monitoring of work/safety performance.
5. Understanding and agreement with established educational goals and required safety rules to achieve these goals.

SOURCES OF ASSISTANCE--These sources include:

1. Individual educational plan.
2. Teacher(s).
3. Parents.
4. Parents' Association for Visually Impaired.
5. Visional Vocational rehabilitation.
6. Private agencies serving vocational needs of visually impaired citizens.
7. District office personnel.

PHYSICALLY IMPAIRED (P.I.)

A child who suffers from any physical disability making it impossible or impractical for participation in full time, normal classroom programs of the public schools and whose intellectual development may be such that the child is capable of being educated through modified classroom programs.

SAFETY CONSIDERATIONS--- This learner may:

1. Best learn safety through methods which have proven to be successful with non-handicapped learners.
2. Best practice safety when the learner's handicapping condition has been planned and programmed to achieve educational success in a safe manner.
3. Best practice safety when the environment is safe for the physically impaired learner.
4. Best practice safety when safety aspects are presented in the classroom, at home, and in the educational setting.

METHODS--Approaches to teaching this learner may include:

1. Successful learning patterns as established for the non-handicapped learner.
2. Positive peer examples.
3. Comprehensive approaches from the regular educator, vocational educator, special educator, and parents.
4. Understanding and agreement with established educational goals and required safety rules to achieve these goals.

There are other categories of handicapped learners being served within the public schools; for example; Trainable Mentally Handicapped, Severely Multiple Handicapped, Autistic, Multiple Handicapped, etc. While many of the safety tenets presented herein are applicable to these learners, it is recommended that staff and parents plan very specifically in these instances.

CONCLUSION:

Planning for the aforementioned handicapped learner is not complex. Most of the safety considerations, methods, and sources of assistance are "common sense approaches" to educating all learners. The learners defined herein are learners who have the ability to be successful in all aspects of programming in a safe, productive manner. The key to success is cooperative planning between the educator, who has the ability to provide hands on experiences; and the special educator, who can provide the methods through which success can occur; and the parents, who can provide overall program support.

EMERGENCY ACTION, MEDICAL FIRST AID, AND ACCIDENT REPORTING

FIRST AID TO THE INJURED--RESPONSIBILITIES AND LIMITS(OSHA)

1. The employer (school) shall ensure the ready availability of medical personnel for advice and consultation on matters of plant (school) health.
2. In the absence of an infirmary, clinic, or hospital in near proximity to the workplace (school) which is used for the treatment of all injured employees (pupils and personnel), a person or persons shall be adequately trained to render first aid. First aid supplies approved by the consulting physician shall be readily available.
3. Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

Selected areas of emergency care were taken from:

EMERGENCY PROCEDURES FOR ACCIDENTS AND ILLNESS IN KANSAS SCHOOLS

(Approved by: Kansas Association for School Health.

Published by: Bureau of Maternal and Child Health.)

ROLE OF THE SCHOOL

The school is responsible for the emergency handling of accidents and sudden illness, but is not responsible for subsequent treatment. The school has an obligation to provide adequate facilities and properly trained personnel to the end that in emergencies, lives may be saved, further injury prevented and pain alleviated as far as this can be done by non-medical persons.

Two important specific problems must also be faced by the school:

1. Safe transfer of responsibility to parents or other accountable persons when emergencies occur.
2. Assurance of needed medical services for injured or ill children when the parents or other persons designated by the parents cannot be reached.

These problems can best be solved locally through the formulation of a written plan developed with the school's medical advisors (selected from the local health department and practicing physicians through their organizations) for handling individual and group emergencies. It is recognized that although basic principles may guide in the development of a program, there will be wide differences among the plans developed in different school systems. These plans depend upon the distribution and availability of physicians, hospitals, and other medical facilities. They also would depend upon the local custom in caring for non-school emergencies. In setting up total programs, the possibility of fitting in local first aid, emergency squad services, and physicians' organizations should be investigated.

It is extremely important for a well-rounded school health program to have a system for handling acute medical emergencies in school and its environs. It is recommended that the school administrator should designate a faculty member and an alternate for each school building to take charge during medical emergencies. This person should have taken at least a standard Red Cross first aid course and a course in cardio-pulmonary resuscitation. All teachers and staff members of the school should be familiar with emergency plans of the school.

The school nurse should be in the position of a liaison officer in conveying information and policy matters between the physician and the school faculty. A nurse's usefulness to the school is greatly diminished when she is required to be in constant attendance at a first aid station, so this should not be included in her duties.

A health room or other area should be established within each school building and emergency care, in-so-far as possible, provided in this area.

A written record of every school injury should be made. The type of injury and the emergency care given should be noted in each case.

Both parents' or guardian's home and business phone numbers and addresses should be listed on the pupil's notification card. There should be two (2) physicians listed in order of preference and a dentist of the parents' choice.

THE SCHOOL'S EMERGENCY FIRST AID PERSONNEL ARE:

Name _____	Location _____
Name _____	Location _____
Name _____	Location _____

EMERGENCY PHONE NUMBERS:

Ambulance Service: _____	Hospital _____
Fire Dept. Rescue Squad: _____	Nearest Poison Center: _____
Police Dept.: _____	Sheriff's Office: _____

DEFINITIONS

EMERGENCY FIRST AID—the immediate care given for life threatening situations.

FIRST AID—the care given to a person who has been injured or has suddenly taken ill.

DO'S AND DON'TS IN EMERGENCY FIRST AID CARE

Do:

1. Keep cool and calm; most cases are not life-threatening!
2. Provide care as nearly as possible with the established procedures of your school.
3. Evaluate the injury or illness with special attention given to difficulties in breathing, the presence or absence of bleeding, and the presence or absence of shock.
4. If indicated, ask that the school's Emergency First Aid persons be called in pairs.
5. After care is completed, check with pupil or employee and witnesses as to what happened and circumstances.
6. Always temper your actions with judgment and reassuring understanding.

DON'T:

1. Move an ill or injured person until evaluated.
2. Give fluids, medicines or try to arouse an unconscious person.
3. Give medications or attempt to reduce dislocations.
4. Diagnose or try to give medical advice.
5. Send a pupil home before consulting parent or emergency designee.

EMPLOYEE'S RESPONSIBILITY FOR EMERGENCY FIRST AID AND FIRST AID CARE

1. The SCHOOL PRINCIPAL is responsible to post the names, room or telephone numbers of employees best qualified to provide emergency first aid care for severe life-threatening emergencies which require immediate intervention to prevent death or serious disability.
2. The EMPLOYEE first aware of an injured or ill person, pupil, or other employee has the responsibility:
 - A. To quickly evaluate the problem.
 - B. To begin emergency first aid or first aid care as indicated.
 - C. If indicated, ask that School's Emergency First Aid persons be called.
 - D. To inform or ask someone else to inform parents or the emergency designee immediately if a severe LIFE-THREATENING EMERGENCY is suspected, for instructions and transfer of responsibility.
 - E. To remain with the victim until problem is resolved or until released to parents, emergency designee or other designated or responsible person.
 - F. If a teacher has given the first aid care, there is a further responsibility to the class. If indicated, an attempt should be made to reduce the anxiety and confusion resulting from the victim's illness or injury.
 - G. To complete, if necessary, an "Accident Report" form or an "Additional Information Needed on Employees only for Workman's Compensation Reporting" form as required.
 - H. To record time, suspected injury or illness, care given, and disposition on Health Room Log.
3. PARENTAL EXEMPTIONS REQUEST—If a parent(s) has made in writing an exemption statement that said pupil is not to be given emergency care and/or first aid, every effort should be made to comply with the request. Parent(s) or emergency designee should be notified to assume responsibility for an injury or illness. A Parental Exemption Request does not apply if injury or illness is a severe, life-threatening emergency.

FIRST AID KITS

The American Red Cross recommends that the following supplies be available in a school first aid cabinet:

2 units	1-inch Adhesive Compress
2 units	2-inch Bandage Compress
2 units	3-inch Bandage Compress
2 units	4-inch Bandage Compress
1 unit	3-inch x 3-inch Plain Gauze Pads
2 units	Gauze Roller Bandage
1 unit	Eye Dressing Packet
4 units	Plain Absorbent Gauze (1/2 sq. yd.)
3 units	Plain Absorbent Gauze - 24" x 72"
4 units	Triangular Bandages
1 unit	Tourniquet - Scissors - Tweezers

URGENT CARE

EMERGENCY FIRST AID PROCEDURES FOR SEVERE, LIFE-THREATENING INJURIES OR ILLNESS

1. Do not move victim until extent of injury or illness is determined.
2. Evaluate the problem and extent of injury or illness.
3. Notify school administrator.
4. Administer emergency first aid - refer to specific section.
5. Notify Rescue Squad -- phone Number: _____
6. If indicated, use the following sequence:
 - A. Open airway--tilt head back. If a suspected fracture of the neck, use a modification jaw thrust movement.
 - B. Restore breathing--mouth to mouth resuscitation.
 - C. Restore circulation--cardiopulmonary resuscitation.
 - D. Stop bleeding.
 - E. Prevent shock.
 - F. Prevent further injury.
 - G. Ask that the principal, nurse, and school emergency first aid persons be notified.

- H. Ask that parent or emergency designee be notified.
- I. Stay with ill or injured person until transfer to parent, emergency designee, or other responsible person.
- J. Complete accident or illness reports, if needed.

SHOCK (Generally accompanies all severe injuries.)

- 1. Notify administration, parents or emergency designee. Early and adequate shock treatment is life saving. DO NOT DELAY! !
- 2. Common symptoms of shock are: pallor; weakness; perspiration; rapid, weak pulse; increased rate of breathing; and mental confusion.
- 3. Until the parent and/or physician takes over:
 - A. Give urgent first aid immediately to eliminate causes of shock; such as stoppage of breathing, hemorrhaging, and severe pain.
 - B. Keep victim lying down--may raise feet 8-12 inches if victim did NOT sustain head injury. If in doubt, leave flat.
 - C. Cover victim only enough to prevent loss of body heat.
 - D. Reassure patient.

FAINTING (Usual symptoms are pallor, shallow breathing, slow and weak pulse. Periods of unconsciousness are of short duration.)

- 1. DO NOT ATTEMPT TO GIVE FLUIDS TO AN UNCONSCIOUS PERSON.
- 2. Keep victim lying flat or with head slightly lowered until fully recovered.
- 3. Loosen any tight clothing and keep crowds away.
- 4. Aromatic Spirits of Ammonia may be used. (a whiff)
- 5. Artificial respiration, if necessary.
- 6. Examine the pupil to determine whether he/she has suffered injury from falling.
- 7. Notify parent.
- 8. If feeling faint, have victim sit down and put head forward between legs.

BLEEDING (To control bleeding, apply pressure in the sequence below.)

1. Place a thick pad of sterile gauze or the cleanest available material directly over the bleeding site.
2. Press firmly with fingers or palm of one hand.
3. Elevate the bleeding parts (head, neck, arm, or leg) unless evidence of fracture, above the heart level.
4. Reinforce compress if blood soaks through; do not remove it.
5. Secure compress with a pressure bandage, if necessary, to carry out further emergency care.
6. Treat shock (pale, sweating, cool skin, faintness) which may accompany loss of blood.
7. If bleeding is significant--as a last resort--where there is a severe life-threatening hemorrhage, such as from accidental amputation of a hand or a foot where bleeding cannot be controlled with pressure, as a last resort, a tourniquet may be applied. A tourniquet is a two-inch wide constricting bandage wrapped twice around the limb about 1 - 2 inches above the bleeding site and tightened by twisting until the bleeding stops. Immediate care by a physician is imperative. Once the serious decision has been made to apply a tourniquet, the tourniquet should not be loosened except on the advice of a physician.

AMPUTATIONS

1. Ensure open airway, restore breathing, restore circulation.
2. Apply snug pressure dressing over the stump. Avoid contamination.
3. Treat for shock:
 - A. Lay patient down.
 - B. Prevent loss of body heat.
 - C. Provide reassurance and attempt to calm patient.
 - D. Give oxygen if available.
4. Splint the injured limb.
5. Wrap severed part in moist sterile dressing.

6. Call Rescue Squad to transport victim and amputated part to hospital as soon as possible.
7. Notify parents and administration.

Do Not:

1. Apply tourniquet unless as a last resort. Tourniquet is rarely necessary. Follow procedure under Bleeding if a tourniquet is used as a last resort--where there is life-threatening hemorrhage.
2. Move the victim any more than absolutely necessary.
3. Give anything by mouth.

WOUNDS

ABRASIONS, BLISTERS, INFECTIONS, MINOR LACERATIONS, etc., and/or CONDITIONS

ABRASIONS (skinned knees, elbows, etc.)

1. Cleanse thoroughly with soap and water, rinse well with water, cleanse area twice or oftener if indicated. Cover with dry sterile dressing.
2. Extensive or deep loss of skin needs medical attention. Notify parent to assume responsibility.

BRUISES

1. Apply cold packs.
2. If deep-involvement is suspected, notify parent to assume responsibility.

BLISTERS (caused by burn or friction)

1. Do not open.
2. If from frictions, apply dressing, try to relieve pressure or irritation.
3. If blister is broken, treat as an open wound. Clean with soap and water and apply dry dressing.

INFECTIONS (boils, infected cuts, and abrasions)

1. Notify parents to assume responsibility.
2. Exclude the pupil from school if indicated.
3. Cover with dry dressing.
4. CAUTION: Do not open or squeeze infections.

MINOR LACERATIONS (CUTS)

1. Cleanse with mild soap and water, rinse thoroughly with water, cleanse area twice or oftener if indicated.
2. Cover with dry sterile dressing.
3. Tetanus is always a potential hazard.

PUNCTURE WOUNDS

1. Puncture wounds through the skin need prompt medical attention and supervision to avoid severe infections.
2. Cleanse with soap and water, rinse thoroughly with water, cleanse area twice or oftener if indicated. Cover with dry sterile dressing.
3. Notify parents and refer to physician.
4. Tetanus is always a potential hazard.

SLIVERS AND SPLINTERS

1. Deep penetration through the skin by slivers or splinters always carries the risk of an infected puncture wound or laceration and should be treated as such.
2. Do not attempt to remove deeply imbedded splinters, or splinters where the area appears to be infected.
3. Notify parents and refer to physician.
4. Tetanus is always a potential hazard.

BITES

DOG AND OTHER ANIMALS

1. Wash and flush out the wound thoroughly for 10 minutes with soap or detergent solution. Cover with nonadherent dressing, if appropriate.
2. Notify parents, administration, or emergency designee.
3. Any information concerning animal's ownership, description and location should be reported to the local authorities, Number _____.
4. Accident report should be written.

HUMAN BITES

1. If the skin is broken, may become seriously infected.
2. Wash and flush out the wound thoroughly.
3. Cover with nonadherent dressing.
4. Notify parent and refer to physician.

INSECT BITES AND STINGS

1. If pupil has a prescribed preventive medication for bee or wasp stings, give immediately according to directions.
2. If pupil has a history of allergies and develops symptoms of fever, joint pain, trouble breathing and/or vomiting--notify parent, administration, or emergency designee, and refer to physician immediately. Mouth-to-mouth resuscitation may be necessary.
3. For severe reactions, apply a constrictive band above the injection site on the victim's arm or leg. Do not apply so tightly that the pulse disappears or that throbbing sensation is produced. Keep the affected part below heart level.
4. Remove stinger if present, if possible scrape off, and avoid squeezing stinger poison sac. In case of a bee sting, remove and discard the stinging apparatus and venom sac (avoid squeezing the sac).
5. Apply cold pack. May also apply soda paste.
6. If suspected Black Widow or Brown Recluse spider bite, notify parent, and refer to physician.

RESPIRATORY EMERGENCY

CESSATION OF BREATHING (Electrocution, drowning, and shock):

1. Start artificial respiration (mouth-to-mouth resuscitation.)
2. Notify Rescue Squad, if available in your community.
3. Notify administration, parents, or emergency designee.

CHOKING (Heimlich Maneuver)

FOREIGN BODY OBSTRUCTION OF THE AIRWAY--In partial obstruction, the victim may have a good or poor air exchange. If victim can cough forcefully, encourage the victim to cough to expel foreign body. Victim usually signals by grasping throat with hand and is gasping for breath. If victim has a weak cough, "crowing-like noise" and skin color becomes blue, start maneuvers for relieving foreign body obstruction.

ABDOMINAL THRUST (Heimlich Maneuver)

VICTIM STANDING

1. Stand behind the victim and wrap your arms around his waist.
2. Grasp one fist with your other hand and place the thumb side of your fist against the victim's abdomen, midway between the xiphoid (bottom tip of breast bone) and the umbilicus (navel).
3. Press your fist into the victim's abdomen with a quick upward thrust. Repeat, if necessary.

VICTIM LYING

1. Position the victim on back, with your knees close to his hips.
2. Place the heel of one hand against the victim's abdomen, midway between the xiphoid (bottom tip of breast bone) and the umbilicus (naval). Place second hand on top of first.
3. Press into the victim's abdomen with a quick, upward thrust. Repeat, if necessary.

Instead of performing the maneuver from the victim's side, the rescuer may straddle either the hips or one leg of the victim. Small child - alternative procedure - turn child upside down over one arm or knee and give two or three sharp blows between the shoulder blades using the heel of the hand.

MOUTH-TO-MOUTH RESUSCITATION

1. Place victim on back immediately.
2. Tilt head back so chin is pointing upward and neck is stretched. If a suspected fracture of the neck, use a modification of the jaw thrust movement.
3. Lift lower jaw forward. This will clear the base of the tongue from the back of the throat and open the air passage.
4. Pinch nose shut and cover victim's mouth completely with the mouth in an airtight contact. For small child, cover both nose and mouth with the mouth.
5. Open your mouth wide and blow (except for a small child and babies) in the victim's mouth or nose until you see the chest rise.
6. Remove your mouth and listen for exhalation. Repeat, blowing at the rate of 12-20 times per minute. For an infant, give short puffs of air at the rate of 18-20 times per minute.
7. Observe chest for rise and fall indicating an actual exchange of air.
8. If air exchange is not seen, recheck head and jaw position. If still no air exchange, turn victim on side and use heel of hand to administer sharp blows between shoulder blades over the spine in an effort to dislodge foreign matter.
9. If necessary, put pressure on stomach with hand not supporting jaw to release any trapped air.
10. If successful, recovery should be rapid; except for electrical-shock and drug poisoning, where efforts must often be continued for long periods.
11. Upon revival keep victim quiet and treat for shock if necessary. Medical care is needed because of the danger of respiratory problems.

ASTHMA (Acute asthma is manifested by and may be accompanied by wheezing and marked difficulty in breathing.)

1. Pupil may have prescribed emergency medication at school. If so, have him/her take it according to direction.
2. Let the pupil assume the position most comfortable for him/her. This is usually a sitting position.
3. Notify parents to assume responsibility.

HEAT STROKE (Skin is red, hot, dry and body temperature may be 106 degree or higher -- IMMEDIATE action necessary.)

1. Notify school administrator, parent, or emergency designee.
2. Cool body by sponging with cool water or place victim in tub of cool water until temperature goes below 102 degrees. DO NOT ADD ICE.
3. Do not give stimulants.

HEAT EXHAUSTION (Skin is pale and clammy. Temperature usually normal. May complain of weakness, nausea, dizziness and cramps.)

1. Have victim lie down, raise feet from 8-12 inches, loosen clothing.
2. Notify school administrator, parent or emergency designee.
3. Treat for shock. See section on shock.
4. Give the victim sips of water, half a glass every 15 minutes, over a period of about 1 hour.

SALT TABLETS

Do not give salt tablets without a physician's order.

EYE INJURIES

NOTIFY SCHOOL ADMINISTRATORS, PARENTS OR EMERGENCY DESIGNEE AS ANY INJURY OF THE EYE SHOULD RECEIVE IMMEDIATE MEDICAL ATTENTION.

CHEMICAL BURNS--Acid or Alkali - EMERGENCY!!!

1. Notify parent or emergency designee.
2. Immediately irrigate or wash face, eyelids, and eye copiously with tap water. A water fountain may be used. Do not use eye cup.
3. Pour water from inner corner outward.
4. Continue to irrigate with water for at least 20 minutes, by the clock. Turn face to side to protect the other eye.

4. Do not use neutralizing solutions as the chemical reaction may be more harmful than the burn.
5. ALKALI BURNS ARE PROGRESSIVE INJURIES.

HOT METAL BURNS-- EMERGENCY!!!

1. Notify parents and school administrators and refer to physician.
2. Do not irrigate.
3. Apply sterile dressing. (Do not apply cotton.)

BLOW TO THE EYE

Sudden blindness or seeing spots following a blow to the eye from a snowball, or other object, may indicate hemorrhage.

A THIN CUT

A small, thin cut on the cornea (window part) of the eye may follow a seemingly minor injury to the eye from a fingernail, leaf of paper, pine needle, or similar object. The child will complain bitterly of pain and light hurting the eye.

1. Notify school administration and parent, and refer to physician for immediate care.
2. Apply dressing over both eyes.

FOREIGN BODIES

1. Prevent the pupil from rubbing the eye.
2. If foreign body is not easily removed, notify parent and refer to physician for immediate care.
3. Apply dressing over both eyes.

MACE OR SIMILAR PRODUCTS

1. Notify school administrator and parents to assume responsibility.
2. Face into gas-free wind.
3. Do not rub eyes; blot tears.
4. Irrigate the eye using tap water.
5. Do not use oil of any kind in the eye.

BONE AND JOINT INJURIES

FRACTURES (suspected)

Notify school administrator and parents as soon as possible after the injury occurs and refer to physician if fracture is obvious or suspected.

1. If suspected fracture is of the neck or spine (back), DO NOT MOVE or allow victim to be moved until ambulance arrives or proper stretchers are available.
2. Do not attempt to straighten limb.
3. If the skin is broken, cover the area with dry sterile dressing. Do NOT cleanse.
4. Apply cold pack to prevent or reduce swelling.
5. Do not move the victim until absolutely necessary, in which case the limb must be splinted by someone with special training before the move is made. Inflatable splints may be used.
6. Do not give fluids.
7. Keep quiet and warm - reassure.

JAMMED FINGERS

1. Apply cold pack to prevent swelling.
2. Advise parent to contact physician if swelling or pain continues.

SPRAINS AND STRAINS

SPRAINS (If any doubt treat as a fracture.)

NOTIFY PARENTS AS SOON AS POSSIBLE AFTER THE INJURY OCCURS AS A PHYSICIAN'S ADVICE IS NECESSARY REGARDING THE STRAPPING, OTHER METHODS OF SUPPORT OR FIXATIONS, FURTHER EXAMINATION OR TREATMENT.

1. Apply cold pack.
2. Elevate the part.
3. Keep individual at rest.

HEAD INJURIES

SCALP INJURIES

1. Check for bleeding--if present, apply dressing snugly.
2. For swelling, apply cold pack.
3. Notify parent to assume responsibility for close observation, if indicated.

SEVERE HEAD INJURIES (possible brain damage)

1. Keep victim lying down, quiet, and warm
2. Symptoms of severe head (brain) injuries are:
 - A. Partial or complete paralysis of arms and legs.
 - B. Disturbance of speech.
 - C. Convulsions.
 - D. Pupils of the eye unequal in size.
 - E. Vomiting.
 - F. Bleeding from nose or ears .
3. Notify school administrator, parent, or emergency designee.

NOSE

NOSEBLEED (A nosebleed is rarely serious.)

1. Have victim sit up, leaning slightly forward over basin or in an inclining position.
2. Apply firm pressure by pressing the bleeding nostril toward the mid line.
3. Ask victim not to blow nose or sniff.
4. If the bleeding continues, notify the parent to assume responsibility.

INJURY AND SUSPECTED FRACTURE OF THE NOSE

Injury may or may not include fracture. If fracture is suspected, cover with dressing, if needed.

TEETH EMERGENCIES

AVULSED (Knocked Out) TOOTH--AN EMERGENCY!!!

1. Notify parent. Advise that dental care is needed IMMEDIATELY!!!
2. If the tooth is completely knocked out, place in mild salt water (1/8th teaspoon to 1 pint of water) and give to parent to take to the dentist.

BROKEN TOOTH-- AN EMERGENCY!!!

Notify parent. Advise that a broken tooth should be treated by a dentist--IMMEDIATELY! (Within 20 minutes, if possible)

TOOTHACHES

1. Check with local dental society for emergency procedure.
2. Hot or cold compresses may give relief.
3. Notify parent, urge dental care.

HEART ATTACK VICTIM

HEART FAILURE (Suspected heart failure with unconsciousness or heart stoppage and cessation of breathing.)

1. Give mouth-to-mouth resuscitation.
2. Give cardiopulmonary resuscitation.
3. Call: _____

Rescue Squad
Telephone Number: _____

4. Notify parents or emergency designee.
5. Notify school administrator.

CONVULSIONS

EPILEPSY AND CONVULSIVE DISORDERS (Epileptics should be known.)

1. Do not restrain.
2. Do not force anything between teeth or in the mouth.
3. Clear area to prevent victim from injuring himself on sharp or hard objects.
4. When relaxed, turn on side and check victim's mouth for dentures, vomitus, or injury to tongue.
5. When victim is calm, assist to a rest area, cover if indicated, and notify school administrator, parent, or emergency designee.
6. After a short rest period, a pupil may return to class activities as able.
7. If the convulsion is severe, or followed immediately by another seizure, advise the parent of your observations and refer to physician.

EMOTIONAL DISTURBANCES

Most emotional disturbances are not acute, but ongoing problems that persist over several months or years. These are characterized by repeated spells of weeping, repeated temper outbursts, gradual withdrawal from normal activities, founded physical complaints, ideas of persecution, possible hallucinations and a general change in the person's personality and activity patterns. For acute emotional disturbances, severe anxiety, hysteria, or panic:

1. Remove from classroom, office or work area.
2. Notify school administrator, parent or emergency designee and assure close observation of victim. Refer to physician.

3. Be kind, reassuring, and patient.
4. Do not argue with victim, restrain ONLY if necessary.
5. Keep under observation.
6. Threats of suicide must be taken seriously.
7. Try to have a witness to victim's behavior.

SUSPECTED DRUG OVERDOSE

The physical signs vary with the drugs used and may be similar to those of an acute emotional disturbance. But marked and persistent changes for the worse in behavior, such as overactivity and jitteriness or the reverse, loss of energy and increasing passivity drowsiness with stupor followed by unconsciousness could be signs of drug overdose.

For a victim suspected to be under the influence of an overdose of a drug, particularly of a non-therapeutic drug:

1. Notify school administrator and parent or emergency designee.
2. Try to identify the drug.
3. If victim is unconscious, call ambulance and transport to hospital emergency room. Accompany victim until parent or emergency designee assumes responsibility.
4. For information on drug overdosage, call Poison Control Center in your area: Telephone Number _____.
5. School staffs are advised to become knowledgeable by current reading, etc.

POISONING SUSPECTED

Poisoning in school may result from the following:

Cleaning materials which contain lye, ammonia, kerosene, and/or other chemicals. Onset may be sudden with nausea, vomiting, diarrhea and severe cramps, followed by chills, fever and prostration.

1. Notify school administrator, parent, or emergency designee.
2. Try to identify the poison. If container can be found, look for label, and specific antidote.
3. If victim is conscious, call nearest Poison Control Center and follow telephone instructions. Telephone Number_____.
4. If victim is unconscious, call ambulance and/or transport to hospital emergency room. Accompany victim until parent or emergency designee assumes responsibility.

CHRONIC HEALTH PROBLEMS

1. Chronic health problems which could be aggravated by an accident or sudden illness should be identified in case of such emergency.
2. Contact parents or emergency designee as indicated.

Flip chart copies of Emergency Procedures for Accidents and Illness in Kansas Schools are available from the Kansas Department of Health and Environment.

Risk Management office.
Years employed: _____
Average wage: _____
Hours per day: _____

EMPLOYER'S REPORT OF ACCIDENT

Date: _____
Bldg. or Location: _____

Name of injured employee: _____ Age: _____ Sex: _____

Home address & telephone: _____ Social Security No: _____

Occupation of employee, regular job title: _____

Name of building or location: _____

Department or division regularly employed: _____

Date of accident or date of initial diagnosis of occupational disease: _____

Time accident occurred: _____ a.m. - _____ p.m.

Place of accident or location if off employer premises: _____

What was employee doing when the accident occurred?: _____

How did the accident happen?: _____

Describe in detail the nature and extent of the injury, and part of the body affected. For example: Bruise to elbow of right arm, cut on third finger of left hand, injury to back, or broken ankle bone of right foot, etc.: _____

Name of object or substance that injured employee: _____

Was employee hospitalized?: _____ Name of hospital: _____ Date: _____

Name & Address of attending physician: _____

Did injury cause employee to miss work?: Yes ___ No ___ If so, give date/s/: _____

Has employee returned to work?: Yes ___ No ___ If so, give date/s/: _____

Did injury cause death?: Yes ___ No ___ If so, give date: _____

NOTE: USE REVERSE SIDE FOR ADDITIONAL INFORMATION

This form should be completed and mailed immediately following the accident to the Risk Management office. Any statements of expense should be submitted, when available, to the Risk Management office, Room 108, Administration Bldg., 428 S. Broadway, Wichita 67202.

(The above information is to be used in completing the Accident Report Form for the Worker's Compensation Commissioner.)

(Supervisor)

(Title)

(Building Principal or Division Director)

STUDENT ACCIDENT REPORT FORM
(Please complete all blanks and circle applicable numbers)

This form is to be completed on any accident which results in: a.) Injury severe enough to cause a student's absence for one-half day or more from school; or b.) Injury severe enough to require a doctor's attention (school jurisdiction accidents only).

Name: _____ Home Address: _____
 School: _____ Sex: Male... 1 Female... 2 Age: _____ Grade: _____
 Town: _____ Time of Accident: Date _____ Time _____ AM... 1 PM... 2
 Place of Accident: School building... 1 School grounds... 2 To and from school... 3 Home... 4 Elsewhere... 5

LOCATION OF ACCIDENT

Athletic field..... 01	Dressing room and lockers..... 11	Restrooms..... 21
Auditorium..... 02	Driveway..... 12	Showers..... 22
Cafeteria..... 03	Gymnasium..... 13	Sidewalks..... 23
Classroom, general, NEC*..... 04	Home, indoor, NEC*..... 14	Stairs, indoor..... 24
Biology class or lab..... 05	Industrial education shops..... 15	Stairs, outdoor..... 25
Chemistry class or lab..... 06	Industrial place or premise..... 16	Streets, highways..... 26
General science class or lab..... 07	Lakes, rivers, body of water..... 17	Swimming pool..... 27
Homemaking class..... 08	Parking areas..... 18	Yards, fields..... 28
Driver education class..... 09	Playground..... 19	Other, NEC*..... 29
Corridor..... 10	Public buildings, all other..... 20	(Specify)

DESCRIPTION OF ACCIDENT

How did accident happen? What was student doing? Where was Student? List specifically unsafe acts and unsafe conditions existing. Specify any tool, machine or equipment involved. _____

IF THIS WAS A MOTOR-VEHICLE ACCIDENT
Indicate the type of vehicle most closely involving the injured person and the status of the injured person.

Motor vehicle..... 1	Driver..... 1
School bus..... 2	Passenger..... 2
Motorcycle..... 3	Pedestrian..... 3
Public carrier..... 4	Bicyclist..... 4
Other..... 5	Other..... 5
(Specify)	(Specify)

TYPE OF ACTIVITY

Normal classroom..... 01
Physical education..... 02
Lab or shop work..... 03
Changing classes..... 04
Going to or from school..... 05
Supervised sports..... 06
Unsupervised sports..... 07
Recess..... 08
Other(Specify)..... 09
Not performing activity..... 10
Unknown..... 11

If FALL on school playground indicate the type of playground surface.

Asphalt..... 1
Gravel..... 2
Grass/dirt..... 3
Concrete..... 4
Other..... 5

NATURE OF INJURY
(Circle most serious one)

Amputation..... 01	Fracture..... 09
Asphyxiation..... 02	Poisoning (solid, liquid, gas or vapor)..... 10
Bite..... 03	Shock (electrical)..... 11
Bruise, contusion..... 04	Sprain, strain..... 12
Burn, scald..... 05	Sting..... 13
Concussion..... 06	Teeth Injury..... 14
Cut, laceration, puncture, abrasion..... 07	Internal Injury..... 15
Dislocation..... 08	Other..... 16
	(Specify)

PART OF BODY INJURED
(Circle most serious one)

ARM:	LEG:
Arm..... 01	Ankle..... 12
Fingers..... 02	Foot..... 13
Hand..... 03	Knee..... 14
Shoulder..... 04	Leg..... 15
Wrist..... 05	Toe..... 16
HEAD:	TRUNK:
Ear..... 06	Back..... 17
Eye..... 07	Chest..... 18
Mouth..... 08	Collarbone..... 19
Nose..... 09	Ribs..... 20
Teeth..... 10	Trunk..... 21
Head, face, neck..... 11	Internal..... 22

DEGREE OF INJURY: Death... 1 Permanent disability... 2 Temporary disability... 3 Non-disabling... 4

Number of school days lost _____

Individual preparing report and title _____

*NEC stands for "Not Elsewhere Classified".

See Reverse Side for Recording of Optional Information.

The following are optional items of information that need not be reported to the State Department of Health and Environment; however, the recording thereof is recommended for use by any school system that keeps duplicate copies of its accident reports as a careful check on the accidents occurring within its jurisdiction and that is also concerned with keeping records of the type of action that is taken when any accident occurs.

Immediate Action Taken

First aid treatment, By (Name) _____

Sent to school nurse, By (Name) _____

Sent home, By (Name) _____

Sent to physician, By (Name) _____

Physician's Name _____

Sent to hospital, By (Name) _____

Name of hospital _____

Was a parent or other individual notified? Yes No

If so, how long after injury? _____ By what means? _____

Name of individual notified _____

By whom notified (Name) _____

Witnesses To Accident

Name _____ Address _____

Name _____ Address _____

Please return completed accident report forms to:

Student Accident Reporting Program
Research & Analysis Section
Bureau of Registration & Health Statistics
Kansas State Department of Health &
Environment
Topeka, Kansas 66620

Rev. 7-76.

106

Building _____

[illegible]

Report for the month of _____ School _____ Nurse _____

HEALTH PROBLEMS:			PROFESSIONAL CONTACTS:		PARENT CONTACTS:		INJURIES CAUSED BY SCHOOL DISTURBANCES:		PUPIL DEATHS:		CONFIRMED DISEASES OR CONDITIONS:		Confirmed
	No.	Code											Diagnosis
<u>Rested</u>			<u>Teacher Conf.:</u>	General								<u>Rubeola</u>	
<u>Appraisal</u>				Specific								<u>Rubella</u>	
<u>Health Counseling</u>			<u>Faculty Counseling</u>									<u>*Streptococcal</u>	
<u>ing.</u>			<u>Principal Conferences</u>									<u>**Other Rash Illnesses</u>	
<u>Sent home result of:</u>			<u>Student Nurses</u>									<u>Chicken Pox</u>	
<u>Illness</u>			<u>" Teachers</u>									<u>Mumps</u>	
<u>Injury</u>			<u>Support Services Teaming Efforts:</u>									<u>Influenza (respiratory)</u>	
<u>Exclusion</u>			<u>Social Worker</u>									<u>Vomiting & Diarrhea</u>	
<u>Care of Injuries:</u>			<u>Speech Clinician</u>									<u>Pediculosis</u>	
<u>Home</u>			<u>Counselor</u>									<u>Scabies</u>	
<u>School</u>			<u>Psychologist</u>									<u>Impetigo</u>	
<u>Medication:</u>			<u>Others (Specify)</u>									<u>Ringworm - skin</u>	
<u>Routine</u>												<u>" scalp</u>	
<u>PEW</u>			<u>Participated in Court Case</u>									<u>Skin Conditions (other)</u>	
<u>Short Term</u>			<u>Community Agencies (specify):</u>									<u>Hepatitis</u>	
<u>*Prof. Referrals</u>	<u>Made</u>	<u>Obtained</u>										<u>Mononucleosis</u>	
<u>*Prof. Contacts</u>	<u>Written</u>	<u>Phone</u>	<u>TEAM STAFFING:</u>	<u>Mtgs.</u>	<u>Pupils</u>							<u>Conjunctivitis</u>	
<u>(for health info.)</u>			<u>Teaming Strategy</u>									<u>Bites - dog</u>	
			<u>Comp. Evaluations</u>									<u>" other</u>	
			<u>Re-evaluations</u>									<u>Syphilis</u>	
<u>PARENT CONTACTS:</u>			<u>Health Referral</u>	<u>Made</u>	<u>Obtained</u>							<u>Gonorrhea</u>	
<u>At home:</u>			<u>Physician</u>									<u>HSV type 2</u>	
<u>Phone:</u>			<u>Dentist</u>									<u>Child abuse</u>	
			<u>Other</u>									<u>Substance abuse - alcohol</u>	
<u>School Conf.</u>												<u>- drug</u>	
												<u>- other</u>	
<u>INJURIES CAUSED BY SCHOOL DISTURBANCES:</u>			<u>Contacts for</u>									<u>Pregnancies - term</u>	
<u>First Aid</u>			<u>Health Info.</u>	<u>Written</u>	<u>Phone</u>							<u>abortion</u>	
<u>Medical Attention Needed</u>			<u>Physician</u>										
<u>Hospitalized</u>			<u>Dentist</u>										
<u>Total Injuries</u>			<u>Other</u>										
<u>PUPIL DEATHS:</u>												<u>*Include scarlet fever and scarletina</u>	
<u>(Place name & cause on back)</u>												<u>**Excluding specific categories</u>	
<u>*Excluding CE or RE Referrals</u>			<u>Team Placement</u>	<u>Spec.Ed.</u>	<u>Reg.Ed.</u>							<u>GROUP ACTIVITIES ATTENDED:</u>	
			<u>Recommendation</u>									<u>P.T.A.</u>	<u>Faculty</u>
												<u>Other (specify)</u>	

REFERENCES

Materials were selected and reviewed from the following sources, and in some instances were incorporated in the production of the preceding unit.

Kansas Association for School Health, Topeka, KS 66620

Kansas Department of Health and Environment, Topeka, KS 66620

Wichita-Sedgwick County Emergency Medical Service, 3830 South Meridian.

ELEMENTARY EDUCATION LABORATORY EXPERIENCES

Over the years, elementary teachers have brought a variety of hand tools and cooking utensils into the classroom. By using these items the pupils were able to participate in laboratory activities that taught them basic manipulative skills. From these individual, scattered efforts and the success achieved through them, many programs that emphasize hands-on-activities for elementary pupils have been written and implemented into the elementary school curriculum. These activities have established a critical need to provide a strong safety program for the pupils and teachers.

Many school systems have existing safety policies adopted by the local boards of education. Within these policies are regulations for general, overall safety and health concerns such as: fire prevention, food services, special education, etc. Other policies relate to specific laboratory courses such as Art, Home Economics, Industrial Education, and Science.

The following safety rules and regulations were developed in the pilot activities of an organized, hands-on program for elementary pupils. They are specifically designed to help administer manipulative activities in the elementary classroom or resource room. However, each activity has its own potential dangers; therefore, this list is not all-conclusive and the teacher should add rules to the list that will meet his/her own individual circumstances.



Elementary Education

SUPERVISION

1. An adult supervisor will be present when the pupil is working in the resource room or other area where an activity is being conducted.
2. Any pupil who is working in the resource room MUST HAVE A PERMISSION SLIP, signed by a parent or guardian. The permission slip will be kept on file by the teacher during the school year. (See sample Permission Slip.)
3. If a pupil is allergic to saw dust or other residue, he/she should be assigned to a task outside the room, but close enough for supervision.
4. A teacher or responsible adult must supervise the use of all power tools, cutting tools, etc.

PUPIL'S CONDUCT

1. During an activity, there will be excitement and noise. However, misbehavior shall not be tolerated.
2. The pupil who cannot or will not obey safety rules and regulations when operating equipment is a definite hazard and shall be removed from the activity, according to standard school procedures.
3. No one should be permitted to talk to the pupil who is sewing, drilling, sawing, or cutting.

PERSONAL PROTECTION

1. The pupil must wear eye protective devices when cutting, drilling, hammering, or finishing materials.
2. No matter how light a cut, scratch, or burn, or how small the splinter, the pupil should immediately be sent to the nurse or a responsible adult.
3. Any major injury must be pursued according to board policy and/or building procedures.
4. During food activities where ovens or hot plates are used, the pupil must wear heat-resistant mittens.
5. Visitors should be urged to wear eye protection.

6. If a pupil indicates he/she has shatter-proof eye glasses, safety goggles must still be worn. This is for side protection and dust.
7. The pupil must not place small, sharp items such as nails or straight pins in his/her mouth.
8. Boards with protruding nails are a hazard and a source of possible injury. Those nails should immediately be pulled from the board.
9. Sandals or open-toed footwear shall not be permitted at the sawing stations. An elementary pupil will occasionally drop saws and could easily cut a toe very badly.
10. The pupil shall not wear rings and other jewelry when working with motor-driven machines or tools.
11. A pupil's hair shall be short or fastened back of the head when using motor-driven machines or tools.

FIRE PROTECTION

1. If there is an open flame furnace in the resource room, NO FLAMMABLE CHEMICALS OR LIQUIDS WILL BE USED.
2. Any flammable or combustible liquid shall be stored in an approved cabinet.
3. Finish rags and table covers, must be disposed of at the end of the school day. All finish rags must be stored in an approved container.

VENTILATION

1. If aerosol spray paint is used, spraying must be done outside the building in a sheltered, well-ventilated area.
2. Some stain finishes may be used if there is no open flame furnace. However, this activity area should be close to an open window for adequate ventilation.
3. Ventilation is very important where there is a lot of dust in the air. Sanding stations should be close to open windows or other well-ventilated areas.

4. Any plastic bonding or acrylic pouring MUST be done in a well-ventilated area. There must not be any open-flame or spark-producing apparatus within the room. Also, protective clothing should be provided.

CHEMICALS

1. If ethylenedichloride is used, the pupil must be in a well-ventilated area, must wear eye protection and rubber gloves, and must immediately wash his/her hands with soap and water after its use. (See Section XIII Chemicals)
2. Ethylenedichloride must be properly labeled, used under strict supervision of a responsible adult, and stored in a locked OSHA approved cabinet.
3. Ethylenedichloride must be capped at all times, even when it is being used.

USE OF TOOLS AND EQUIPMENT

1. The pupil shall not use large power tools such as the scroll saw.
2. Power tools which the pupil may use (under close supervision) are: saber saws, sewing machines, sanders, electric drills, etc. The use of all small power tools must first be demonstrated by the teacher or responsible adult.
3. All tools must be kept off the floor. This is not only good care of equipment, but they could become a safety hazard.
4. When using paring knives, electric hand mixers, irons, etc., the pupil should receive instruction and demonstration on their usage. An adult must be present when the pupil uses those items.
5. If at any time a pupil demonstrates that he/she cannot use a cutting tool safely or properly, that pupil should be on a non-dangerous job.
6. All sawing or drilling requires a piece of scrap wood between the tool and the table in order to protect the table.
7. Power tools, such as drill stands, should be clamped tightly to the table.
8. Pupils who operate a paper shear are to be selected carefully.
9. Machines, power tools, or hot appliances should be arranged so

that the workers, passing pupils, and visitors are protected from any hazards.

10. The pupil must remove the check key from the electric drill before starting it.
11. When adjusting or resetting any power tool or appliance, the equipment is to be unplugged.
12. The electrical switch on any power tool is to be in the "OFF" position before plugging it into the electrical circuit.
13. Files should always have handles.
14. Hammers with loose heads should be removed from the tool cart.
15. Tools and materials are not to be carried in pockets. They often cause injury.
16. A pupil using a sharp-edged tool (knife, chisel, or gouge) should always cut away from the body and not directly at other pupils.
17. Material should not be held in the hand while carving, cutting, or chiseling.
18. After each activity, all tools, appliances, and supplies are to be returned to their proper storage place and inventoried.
19. Tools, equipment, and appliances are to be cleaned after each activity so that they will be ready for the next class to use.
20. All brushes used for finish must be cleaned and wrapped in paper at the end of the day.

CLEAN-UP

1. All tools and supplies are put away properly.
2. Work areas and tables are completely cleaned.
3. All appliances, measuring cups, and dishes are washed.
4. Dish towels are taken home and washed.
5. Floors are swept to remove dust and scraps.
6. Lights are turned off.
7. Cabinets, windows and room are locked.
8. Key is returned to proper storage area.

SAMPLE PARENT PERMISSION SLIP

(Date)

(Name of School)

Dear Parent:

As part of our program, your child will have the opportunity to participate in hands-on projects in Art, Home Economics, Industrial Arts, Language Arts, Mathematics, Science and Social Studies. Your child may be working with basic hand tools, small electrical appliances and tools, wood burners, carving tools, and/or sewing machines.

Safety education is an integral part of our program. We will demonstrate the equipment and take all necessary precautions for your child's safety. You may also help by talking with your child about safety in the use of tools or kitchen utensils.

In order for us to be sure that you know of these activities, we must have your consent before allowing your child to use any equipment. Therefore, the attached permission slip must be signed, detached, and returned to us before your child is allowed to participate in the activities.

You are welcome to visit our classroom at any time during these activities. Also, if you desire to assist the teacher with the activities, we would welcome your participation. Please feel free to ask any questions concerning this program.

(Teacher or Supervisor)

I give my permission for _____ to use the
equipment and tools in the classroom.

(Parent or Guardian)

(Date)

REFERENCES

Materials were selected and reviewed from the following sources, and in some instances were incorporated in the production of the preceding unit.

Geil, J., A Guide to Using Tools in the Elementary Classroom, Stanley Tool Company, New Britian, CT.

----- A New Point of View, Stanley Tool Company, New Britian, CT.

The Little Carpenter, Stanley Tool Company, New Britian, CT.

Point of View Elementary School Industrial Arts, Stanley Tool Company, New Britian, CT.

Stanley Tool Guide, Stanley Tool Company, New Britian, CT.

ART EDUCATION

CERAMICS

In ceramics, health hazards fall into two main categories: the handling of the raw materials and the inhalation of fumes during the firing of the pottery.

CLAYS

Because of the dry, powdery nature of many ceramic materials, the primary health hazard existing in the ceramics studio is that of dust. Great attention must be paid to the problem of dust control. An adequate exhaust system, well-ventilated spraying booths, and care in cleaning floors and furnishings with water rather than with a dry brushing are all necessary to insure low levels of dust and thus adequate safety.

Clays contain silicates and free silica (SiO_2). The inhalation of silica dust from handling the clay in dry form can lead to silicosis or "potter's rot." Symptoms may take years to develop and include shortness of breath, decreased chest expansion, and increased susceptibility to infections. Eventually, severe scarring of the lungs can result. Inhaling large quantities of kaolin dust can also cause a mechanical clogging of the lungs called kaolinosis. The most hazardous operations are the mixing of clay dust and the breaking up of dry grog. The contamination of the studio with dry clay dust is also a major hazard.

GLAZES AND COLORANTS

The dusts created by the grinding and handling of some of the raw materials used for colors and glazes can also create silicosis; especially with high silica materials like flint, feldspar, and talc. Another hazard of the colorants and glazes is that many of the minerals used contain highly toxic metals. Inhalation of the dusts (e.g., in spraying) or ingestion of these materials can lead to serious chronic poisoning.

Among glaze minerals, those containing lead are highly toxic. The use of lead frits decreases but does not eliminate the hazard. Other toxic glaze materials include barium carbonate, asbestos, and alkali oxides.

Many of the colorants contain toxic metals like antimony, chromium, manganese, uranium, cadmium, and vanadium. Nickel compounds are skin sensitizers and possible cancer-causing agents. Chromates (lead chromate, zinc chromate, and iron chromate) may cause lung cancer.

FIRING

During the firing process, toxic fumes and gases are produced. This can include fluorine, chlorine, and sulfur dioxide from the breakdown of the raw glazes to the oxides, and also the possible release of toxic metal fumes from the glazes and colorants (with fritted glazes, the gases are not produced since that happened during the fritting stage). Many of these same gases, especially sulfur dioxide, may be released during bisque firings. In addition, gas-fired kilns are a source of carbon monoxide. Therefore, it is essential that kilns be ventilated to the outside atmosphere, either by chimneys (as are used for gas-fired kilns) or through an overhead hood ventilation system.

CERAMIC MATERIALS

RAW MATERIALS	USAGE	TOXICOLOGY	PRECAUTIONS
Albany Slip	Slip clay used as glaze.	Nontoxic	Use filter respirator when mixing the powder to water.
Alumina (Al_2O_3)	Stabilizer or stiffener in glaze of clay body.	Nontoxic	Use filter respirator when mixing the powder to water.
Ball Clay	Use in clay bodies that are highly plastic in nature (fine particle size).	Nontoxic	Must use filter respirator when mixing materials to water.
Barium (BaO) Oxide	To promote brightness of color in a glaze. Used as a flux in glazes.	Highly toxic	Use filter respirator, rubber gloves, and rubber apron when handling. Absorption of as little as one gram can be fatal.
Bentonite	Extremely plastic, fine particle clay, used in both clay bodies and glazes.	Nontoxic	Must use filter respirator when handling material.
Bone Ash	Used as a flux and opacifier in glazes.	Nontoxic	Must use filter respirator when handling material.
Borax (Sodium-borate $Na_2B_4O_7 \cdot 10H_2O$)	Next to lead, it is the major low-fired flux.	Highly toxic	Must use filter respirator, rubber gloves, and rubber apron when handling material.
Calcium (CaO) Oxide	Is the primary source of calcium for clay bodies and glazes. Used as a flux in glazes.	Toxic	Must use filter respirator when handling material.

CERAMIC MATERIALS

RAW MATERIALS	USAGE	TOXICOLOGY	PRECAUTIONS
Cedar Heights-Stoneware	It is a naturally occurring high temperature clay body.	Nontoxic	Must use filter respirator when mixing material for clay body.
Chromium Oxide (CrO)	Commonly used as source of green color for glazes. Highly refractory. Used as opacifier.	Highly toxic	Must use filter respirator when handling material.
Cobalt (Co)	Used as colorant to create blues in glazes.	Toxic	Must use filter respirator, rubber gloves, and rubber apron when handling. Absorption of as little as one gram can be fatal.
202 Colemanite (Hydrous calcium borate--Ca ₂ B ₆ O ₁₁ ·5H ₂ O)	Composed of borax and calcium. Is a substitute for calcium in glaze, low-fire flux, an opacifier.	Toxic	Must use filter respirator, rubber gloves, and rubber apron.
Copper (Cu)	As coloring-metallic oxides.	Toxic	Must use filter respirator, rubber gloves, and rubber apron.
Copper Oxide (CuO)	As coloring agent.	Toxic	Must use filter respirator, rubber gloves, and rubber apron.
Cornwall Stone	Used in bodies glaze. It has characteristics which lie between kaolin and feldspar.	Nontoxic	Must use filter respirator when handling material.
Dolomite (Calcium magnesium carbonate--CaMg(CO ₃) ₂)	For clay body and glaze; a combination of MgO and CaO. Dolomite is used as a flux in glazes.	Toxic	Must use filter respirator, rubber gloves, and rubber apron.

CERAMIC MATERIALS

RAW MATERIALS	USAGE	TOXICOLOGY	PRECAUTIONS
Feldspar	Used as flux in clay bodies and glazes.	Nontoxic	Must use filter respirator when handling material.
Flint	Also called silica, is used in glazes and clay bodies--glass former.	Nontoxic	Must use filter respirator when handling material.
Frit	A ground glass in combination with other materials--used as a means of making certain materials less toxic or less soluble.	Nontoxic	Must use filter respirator when handling material.
Iron Oxide (FeO)	As a colouring agent.	Nontoxic	Must use filter respirator when handling material.
Kaolin	Is a clay body (china clay) or white clay) for glaze; is used for refractory element.	Nontoxic	Must use filter respirator when handling material.
Lead (Pb)	Used as a secondary flux; creates a soft glass form in low temperature.	Toxic	Must use filter respirator, rubber gloves, and rubber apron. Absorption of as little as one gram can be fatal.
Lithium (Li)	Is a very active flux; quite similar to sodium with strong effect on metallic oxides color brightness.	Toxic	Must use filter respirator when handling material. When ingested, may cause a severe disease similar to leukemia.

CERAMIC MATERIALS

RAW MATERIALS	USAGE	TOXICOLOGY	PRECAUTIONS
Magnesium (Mg)	As a high temperature refractory and flux. Opacifies a glaze; makes strong glass.	Toxic	Must use filter respirator, rubber gloves, and rubber apron.
Manganese Dioxide (MgO ₂)	As a colorant.	Toxic	Must use filter respirator when handling material. Inhalation or ingestion will cause muscular discoordination, paralysis, and other nervous system disorders.
Nepheline Syenite	As flux in white ware bodies. Is a substitute for potash feldspar.	Nontoxic	Must use filter respirator when handling material.
Nickel Oxide (NiO)	A colorant--use 5% to 10% in proper glaze to produce a crystalline structure.	Toxic	Must use filter respirator, rubber gloves, and apron.
Petalite (Li ₂ -Al ₂ O ₃ -8SiO ₂)	Used as an auxiliary body flux to reduce thermal expansions and increase resistance.	Toxic	Use filter respirator, rubber gloves, and apron.
Potassium Oxide (K ₂ O)	Is a strong flux. Used to modify color effects.	Toxic	Use filter respirator, rubber gloves, and apron. Reacts violently with water. Handle with tongs, not bare hands. Keep tightly closed.
Rutile (Titanium Dioxide TiO ₂)	As a colorant.	Toxic	High concentration of the dust may cause irritation to respiratory tract. Use filter respirator.

CERAMIC MATERIALS

RAW MATERIALS	USAGE	TOXICOLOGY	PRECAUTION
Silica (flint) (Silicon dioxide - SiO_2)	As a glass maker in glass and clay.	Toxic	Use filter respirator. Prolonged inhalation of the dust can cause fibrosis of lung. Increases a susceptibility to tuberculosis.
Soda Ash (Anhydrous sodium carbonate Na_2CO_3)	As an active glaze flux. Used commonly in glaze as frit ingredient.		Use filter respirator, rubber gloves, and apron. Sensitivity reactions may occur from repeated topical use. Concentrated solutions in contact with the skin or eyes may cause local necrosis.
105 Sodium Oxide (Na_2O)	As a strong glaze flux. To promote color brightness.	Toxic	Use filter respirator, rubber gloves, and apron. Reacts violently with water-forming sodium hydroxide (lye). Keep tightly closed.
Talc (Varies from 3M O 4SiO-HO to 4M O- 5SiO- HO).	Used to flux clay bodies. Promotes a slight opacity in glazes.	Nontoxic	Must use respirator when in contact with material.
Tin Oxide (SnO)	A very effective opacifier. From 5% to 7% will produce a completely opaque white glaze.	Nontoxic	Must use respirator when in contact with material.

CERAMIC MATERIALS

RAW MATERIALS	USAGE	TOXICOLOGY	PRECAUTIONS
Vanadium (V)	As a colorant. Added in small amounts to a glaze will produce strong yellow.	Highly toxic	Must use respirator when in contact with material. Even small amounts, either inhaled or ingested, can be dangerous.
Volcanic Ash	Formed from the dust of volcanic glass. Volcanic ash contains a high percentage of silica and is commonly used as a source of silica in glazes.	Nontoxic	Must use respirator when in contact with material.
106 Wallastonile (CaSiO ₃)	Is a natural calcium silicate. Used as a replacement for flint and whiting. Used in both bodies and glazes.	Slightly toxic	Must use respirator when in contact with material. Inhalation of the dust may cause irritation of the respiratory tract.
Whiting (Calcium-Carbonate CaCO ₃)	Is a source of calcium in pottery bodies and glazes.	Toxic	Use respirator, rubber gloves, and apron. A strong caustic. May cause severe irritation of skin and mucous membranes.
Wood Ash	Used alone or as a base for glazes. Chemical composition varies according to the source.	Nontoxic	Must use filter respirator when handling.
Zinc Oxide (ZnO)	Used as a flux in small amounts. Creates mattness with large amount.	Toxic	Must use filter respirator when handling.
Zircopax	Is a standard commercially-produced opacifier.	Nontoxic	Use filter respirator when handling.

CERAMIC PROCESSES

MIXING AND APPLYING GLAZES

1. All mixture and application of glazes must be done in a well-ventilated area.
2. Pupils must have a complete knowledge of all glaze materials before attempting to handle them.
3. Pupils must wear filter respirators at all times when dealing with glaze materials.
4. Pupils must wear close-fitting rubber or vinyl gloves at all times while dealing with glaze materials.
5. Eating or drinking in glaze laboratories is prohibited.
6. Spilled glaze materials or glazes should be cleaned from the tables and floors immediately.
7. Glaze materials and equipment must be returned to their proper storage areas.
8. Hands must be washed before leaving the studio.

SHAPING

1. Pupils with cuts or sores on their hands or arms must not handle clay.
2. Pupils must wear a filter respirator while handling or working with clay powder.
3. Pupils working in the studio should wear shoes at all times. Sandals are not acceptable.
4. Safety tests must be passed before pupils are allowed to operate the equipment.
5. Any spilled water must be cleaned up.
6. Clay must be returned to its proper storage.
7. Pupils must wash their hands and clean under their nails before leaving the studio.

PRECAUTIONS FOR MIXING CLAY

1. Preparation

- A. Mixing of clay should be done only in an adequately ventilated area.
- B. Protective clothing such as overalls and smock should be worn. Long hair should be tied back.
- C. Gloves should also be worn.
- D. Bracelets, rings, necklaces, and other jewelry which might be caught by machines should be removed.
- E. Safety tests for each piece of equipment must be passed.

2. Mixing

- A. Filter respirators must be worn at all times.
- B. Adding dry clay to water in the mixer reduces the amount of dust that is created.
- C. One should carefully follow all instructions for mixing.

3. Clean up

- A. Spilled water must be mopped up.
- B. Pupils must wash their hands and clean under their nails before leaving the studio.

FIRING

- 1. Pupils should not be allowed near the kiln while firing.
- 2. Pupils must not be allowed to operate the kiln.
- 3. If teachers are not familiar with kiln operation, it is advisable that they consult the manufacturer's representative for training in this operation. Kilns must be equipped with safety controls.
- 4. Teachers must carefully follow all safety precautions recommended by the manufacturer.
- 5. Fumes from all kilns are dangerous. It is the responsibility of the teacher to be aware of any ventilation problems which might exist in and around the kiln.
- 6. Dark glasses should be worn while peering into spy holes.

THE SPRAY BOOTH

Turn on the exhaust fan before operating the spray booth!

Wear rubber gloves and dust mask when using the spray booth!



SPRAY BOOTH



VAPOR RESPIRATOR

WASH THE HANDS AFTER WORK IN THE SPRAY BOOTH IS COMPLETED!

THE POTTER'S WHEEL



Kick Wheel

- Tie long hair back!
- Don't leave wheel before it is completely stopped!

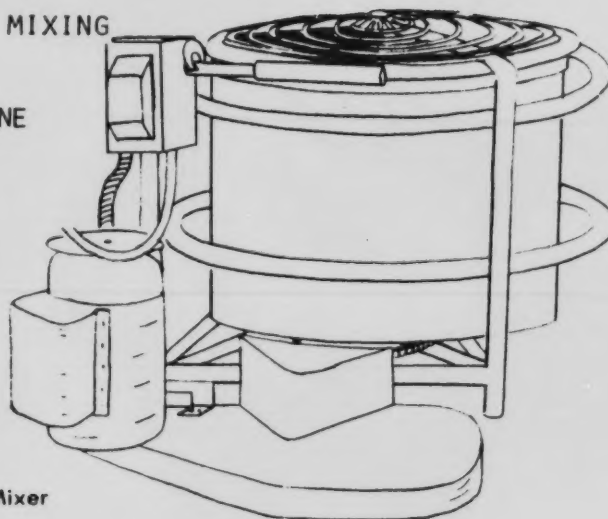


Electric Potter's Wheel

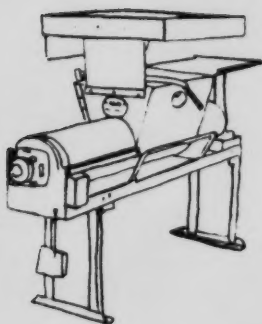
- Don't wear loose clothes!
- Keep the water off the floor to avoid electrical shock!
- Do NOT USE UNLESS THE MACHINE IS PROPERLY GROUND.

CLAY MIXER AND PUG MILL

- DO NOT WEAR LOOSE CLOTHES WHEN OPERATING THIS MACHINE!
- FOLLOW THE MACHINE'S INSTRUCTIONS CAREFULLY!
- WEAR A DUST MASK WHILE MIXING CLAY!
- DO NOT USE UNLESS THE MACHINE IS PROPERLY GROUNDED!
- PROPER VENTILATION MUST BE PROVIDED!



Clay Mixer

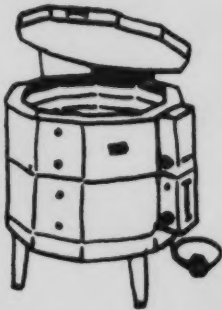
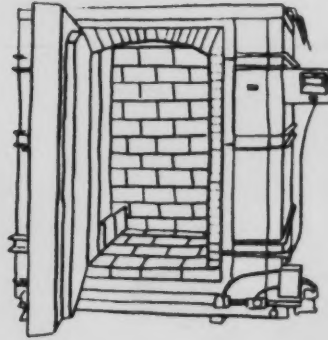


Pug Mill

- DO NOT PUT THE HANDS IN THE MACHINE WHILE IT IS IN OPERATION!
- DO NOT SPILL WATER AND CLAY ON THE FLOOR. IN CASE OF A SPILL, CLEAN IT IMMEDIATELY!
- KEEP THE LID OF THE MACHINE SHUT WHILE THE MACHINE IS IN OPERATION!
- DO NOT MIX CLAY IF THERE ARE ANY CUTS ON THE HANDS!
- WASH THE HANDS AFTER MIXING CLAY!
- DO NOT USE UNLESS THE MACHINE IS PROPERLY GROUNDED!

KILN SAFETY CHECKS

- ✓ CHECK TO SEE WHETHER THE KILN IS SAFELY INSTALLED ON A CONCRETE OR BRICK FLOOR.
- ✓ CHECK TO SEE WHETHER THE KILN HOOD AND VENTING SYSTEM ARE IN A SAFE OPERATING CONDITION.
- ✓ APPROVED SAFETY CONTROLS IN THE GAS LINE, AND TEMPERATURE CONTROLS MUST BE IN SAFE OPERATING CONDITION.



- ✓ DO NOT ALLOW PUPILS TO GO INTO THE KILN ROOM.
- ✓ DO NOT ALLOW PUPILS TO OPERATE THE KILN.
- ✓ THE KILN MUST BE PROVIDED WITH APPROVED SAFETY CONTROLS.
- ✓ READ AND UNDERSTAND THE INSTRUCTION MANUAL FOR FIRING AND MAINTAINING THE KILN.

- MOST QUESTIONS CAN BE ANSWERED BY THE KILN DISTRIBUTOR.

CERAMICS SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

MIXING AND APPLYING GLAZES

- _____ 1. Mixing and applying glazes should always be done in:
- A. a well-ventilated area.
 - B. a well-lighted area.
 - C. a classroom.
 - D. both A and B
 - E. none of the above.
- _____ 2. Pupils must know which of the following facts about glaze materials before using them:
- A. toxicology.
 - B. procedures.
 - C. reactions between glaze materials.
 - D. temperature effects on glaze materials.
 - E. safety rules.
 - F. all of the above.
- _____ 3. When dealing with glaze materials, pupils must wear:
- A. rubber gloves and filter respirators.
 - B. cotton aprons and rubber gloves.
 - C. goggles and filter respirators.
 - D. old clothes and safety glasses.
 - E. all of the above.
- _____ 4. Pupils should always wash their hands before leaving the studio because:
- A. it is good personal hygiene.
 - B. it helps avoid fatalities.
 - C. if they don't they might get something smeared on a project.
 - D. some chemicals in use are very poisonous.
 - E. none of the above.

SHAPING

True-False:

- T F 1. Pupils with cuts or sores on their hands or arms may handle clay.
- T F 2. Pupils should wear filter respirators while handling or working with clay powder.
- T F 3. Pupils working in the studio should wear shoes at all times.
- T F 4. Sandals are acceptable.
- T F 5. It is necessary to pass safety tests before operating equipment.
- T F 6. It is necessary to clean up any spilled water.
- T F 7. Clay must be returned to its proper storage.
- T F 8. It is necessary to wash the hands and clean under the nails before leaving the studio.

MIXING CLAY (PREPARATION)

- _____ 1. Clay mixing should be done only in adequately-ventilated areas because:
 - A. inhaling silica or potter's flint causes silicosis, a disease of the lungs.
 - B. inhaling clay dust can cause permanent damage to the lungs.
 - C. those having silicosis are more susceptible to other pulmonary diseases.
 - D. all of the above are true.
 - E. it is not necessary to mix clay in an adequately-ventilated area.
- _____ 2. Before mixing clay:
 - A. long hair must be tied back.
 - B. all jewelry must be removed.
 - C. permission must be obtained from the teacher.
 - D. protective clothing must be worn.
 - E. safety tests over each piece of equipment must be passed.
 - F. all of the above must be done.

_____ 3. When mixing clay:

- A. wear overalls and smock to cover loose clothing.
- B. wear gloves to keep the hands clean.
- C. tie back long hair.
- D. do A and C only.
- E. do B only.

_____ 4. To reduce the amount of dust created:

- A. add both dry clay and water to the mixer at the same time.
- B. add dry clay to the water in the mixer.
- C. add water to the dry clay in the mixer.
- D. do any of the above.
- E. do either A or B

(MIXING)

True-False:

T F 5. Filter respirators must be worn at all times.

T F 6. It is necessary to carefully follow instructions for mixing clay.

(CLEAN UP).

_____ 7. After one has finished, he/she must:

- A. mop up any spilled water.
- B. wash the hands and clean under the nails.
- C. clean up the studio.
- D. do all of the above.
- E. do none of the above.

FIBERS AND FABRICS

Most fiber dusts can cause respiratory irritation, and sometimes allergies, when they are inhaled regularly. Spinning and wool carding create the most fiber dust. Imported wool or yarn may carry anthrax spores. It should be decontaminated before purchase.

The dyes in synthetic materials are often solvent-based and may cause irritation. Chemicals used as fire retardants on finished fiber pieces are usually toxic. A borax solution is preferred to other solutions, although care must be used to avoid getting the fine mist into the lungs.

Some large dry cleaning establishments can "fireproof" fiber pieces. These pieces are then considered fire retardant by the fire department. Fiber works which hang in public places are required to be fire retardant. Batting and other flammables used in soft sculpture must be stored away from sources of heat.

Grasses, or other materials used in basketry, which require prolonged soaking should be rinsed and covered with fresh water every two or three days to avoid the buildup of bacteria. An infection around the fingernails which follows working with grasses, reeds, etc. could be fungal and warrants medical attention.

Pupils working with sewing machines must be tested on their proper use. Weavers may suffer from accelerated deterioration of the spinal column, which results from sitting in the same position for hours at a time.

TIE-DYE

Pupils must not mix dyes. Every person who handles the dyes or the wet, dyed fabric must wear rubber gloves. If household or allpurpose dyes are used, butyl rubber gloves must be worn. Waterproof aprons must be worn to prevent any skin absorption of the dye.

The use of a hot dye bath requires extra caution. Pupils must have a safe area away from the dye bath where they can wait their turns. They must also pass the "Dye Safety Quiz" before they are allowed to do this project.

BATIK

Batik is a process for coloring fabrics in which parts of a fabric are covered with melted wax so that only the uncovered portions will take the dye.

USING HOT WATER DYES (Refer also to Textile Dye unit.)--Household or all-purpose dyes containing direct and acid dyes are used the most frequently because they are the most easily obtained. Although the dye bath is prepared with hot water, it is used cold so it will not melt the solid wax. Recommended dye bath containers are enamel, stainless steel, or galvanized ware. One should avoid aluminum or copper containers. Butyl rubber gloves must be worn to mix the dye and when handling wet, dyed fabric. A waterproof apron must be worn to protect the teacher from dye splashes. The pupils must not be allowed to mix dyes.

A hot plate or electric skillet should be used to melt the wax. Often, wax is melted in a double boiler, or a can of wax is placed in a pan with three or four inches of water which is heated to a low boil.

NEVER MELT WAX OVER AN OPEN FLAME--Paraffin is a fire hazard when it is molten. If overheated, the wax decomposes to release highly irritating acrolein fumes. After the heat is turned on, the wax must never be left unguarded. Baking soda quickly smothers this type of fire.

A tjanting is a drawing tool which has a metal reservoir to hold hot wax. Electric tjantings add the extra hazard of electric cords.

Other ways to apply the wax include brushes or stamps. Some craft books recommend applying the wax from the tip of a lighted candle, dipping the fabric into the hot wax container, or spraying the wax onto the cloth. These practices are better employed by an individual crafts worker than by pupils in a school.

Common methods for removing the wax after the dyeing is completed:

1. Dissolve in boiling water (most hazardous).
2. Scrape off the larger pieces and then hold them under hot running water.
3. Iron over pads of newspaper (protect the iron with wax paper).

To remove the final wax residue in a finished batik piece, many craft books recommend solvents ranging from benzene to carbon tetrachloride. The use of these chemicals cannot be justified in an art classroom. The most prudent solution is to take the finished batik pieces to a dry cleaner (they often give a bulk rate). This also assures colorfastness and washability.

Pupils must pass a "Batik Safety Quiz" before doing this project.

USING COLD WATER DYES--

1. Containers may be plastic, glass, or pottery.
2. Table salt is added to intensify the color of the dye.
3. Washing soda is sodium carbonate and helps the dye to adhere to the fabric. Fixer, also known as soda ash or-anhydrous sodium carbonate, also makes the dye more effective.
4. Paste activator, also recommended for use with Procion dye, has an unknown chemical composition.
5. Rubber gloves and waterproof aprons must be worn when working with these dyes.

REVERSE BATIK

A bleaching agent is used to remove color from a previously dyed fabric. Color remover is often used, as is household chlorine bleach. These agents, however should never be used in classroom without an excellent ventilation system.

TEXTILE PAINTS

These are used either in conjunction with batik or separately. One must determine the solvent (vehicle) used in the particular brand that is selected and then check the "Hazardous Chemicals" section of this manual to determine which precautions must be taken. Some companies advertise their textile paint as being "nontoxic" or water-based, but then sell a binder or other agent to be used with the paint which is not identified as to its chemical properties.

TEXTILE DYES

All dyes have in common a substrate (beginning material) to which is added a pigment. The pigments in dyes have various sources, as do the pigments in paints. To obtain a bright yellow, for example, some dye companies use azo (nitrogen) compounds, which are very hazardous. Some dyes are organic chemicals which are formulated to adhere to protein (silk and wool).

Powdered dye which is inhaled can directly enter the bloodstream through the lungs. For this reason, pupils must not be allowed to mix powders. Teachers must wear rubber gloves and waterproof aprons. Masks will give protection from powders. Dye powder which comes in packets should be held under water and then cut or torn open. If properly done, no dye dust will rise to the breathing zone. Liquid dyes eliminate the problem of loose powder.

Dye can enter the skin through any cut or abrasion. The natural oil in the skin usually keeps most dye out. However, this waxy protection is worn away by solvents and other art materials.

Dye spills should be cleaned up immediately, as they will become powder when dry. Dye containers should never be used for cooking.

BATIK SAFETY QUIZ(use with Dye Safety Quiz)

NAME _____

CLASS _____

DATE _____ GRADE _____

(Circle true or false)

- | | | |
|--|---|---|
| 1. Rubber gloves will protect one from a hot wax burn. | T | F |
| 2. If wax solidifies in the tjanting, it should be scraped out with a sharp object. | T | F |
| 3. A tjanting should be filled slowly and carefully. | T | F |
| 4. People crowded together at a work table are more apt to get burned by hot wax. | T | F |
| 5. If a person is in a hurry, he/she should turn up the heat under the wax. | T | F |
| 6. A wax burn should be treated with cold water. | T | F |
| 7. An electric iron may be plugged into the extension cord on the hot plate, and one can then iron on the wax table. | T | F |
| 8. Water should be kept away from the hot wax. | T | F |
| 9. If the hot wax starts smoking, throw water on it. | T | F |
| 10. Baking soda is used on a wax fire. | T | F |
| 11. Electric cords should be carefully kept away from aisles where people walk. | T | F |
| 12. If the wax gets too thick, thin it with water. | T | F |
| 13. The wax should never be unguarded after the heat is turned on. | T | F |

(Circle true or false)

- | | | |
|--|---|---|
| 14. Two hundred forty degrees Fahrenheit
is hot enough to melt the wax. | T | F |
| 15. The teacher is the only one who should
carry hot wax from one place to another. | T | F |

KEY -

- | | |
|------|-------|
| 1. F | 9. F |
| 2. F | 10. T |
| 3. T | 11. T |
| 4. T | 12. F |
| 5. F | 13. T |
| 6. T | 14. T |
| 7. F | 15. T |
| 8. T | |

DYE SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

(Circle true or false)

- | | | |
|--|---|---|
| 1. All dyes are alike. | T | F |
| 2. A dye is chosen for its ability to penetrate a certain kind of fabric. | T | F |
| 3. Pupils should help the teacher mix the powdered dyes. | T | F |
| 4. If a person's gloves have a hole or tear, he/she should report it to the teacher. | T | F |
| 5. Rubber gloves will last longer if they are washed and rinsed immediately after using. | T | F |
| 6. Dye spills should be left to evaporate and turn back to powder. | T | F |
| 7. Dye splashed on the skin should be washed off immediately with soap and water. | T | F |
| 8. If dye is splashed in the eyes, they should be continuously rinsed with clear water. | T | F |
| 9. Crowding around a dye bath with one's friends is the best way to use dye. | T | F |
| 10. Cuts and abrasions will allow dye to enter the skin. | T | F |
| 11. People use rubber gloves to keep their hands from getting wet. | T | F |

KEY- 1. F 5. T 9. F
 2. T 6. F 10. T
 3. F 7. T 11. F
 4. T 8. T

HOUSEKEEPING AND GENERAL SAFETY

One of the most vital areas of pupil/teacher safety in the studio is related to housekeeping. Accidental exposure to toxic chemicals, falls due to liquid spillage, cuts and abrasions as a result of tools and equipment left in an unguarded manner could be all but eliminated if common sense rules of daily housekeeping are observed.

ALL CHEMICALS AND SOLVENTS should have adequate provisions made for their safe storage. A locked, flameproof cabinet affords some of the best protection available. As a general rule, only that amount of a chemical or solvent necessary for a five or six week period should actually be stored in the studio. The storage of large quantities of flammable solvents and caustic or corrosive chemicals is taking an unnecessary risk. If solvents are purchased in bulk form, it is recommended that they be transferred to suitable smaller containers for studio use. The use of safety containers is highly recommended. All containers should be clearly labeled as to their contents. Plastic or metal containers should be used rather than breakable glass containers. Coke bottles, milk cartons, and soft drink cans (which might tempt a child to drink the contents, or an adult to drink by accident) should never be used. Handling chemicals and solvents must be done with care and knowledge. The pupils and teacher should be aware of the risk involved when handling solvents and chemicals, and adequate provisions for their usage, storage, and disposal should be made. If any chemical or solvent must be poured down the sink, it must be done with a degree of caution. The substance should be poured directly down the drain while flushing it at the same time with a lot of water. One chemical should never be poured directly on top of another one. The water should run long enough to remove the substance from the drain trap. Failure to flush adequately can result in the formation of toxic gases and, in some cases, an explosion.

Any liquid spilled on the floor should be removed immediately. Failure to do so can result in one of the most unnecessary and preventable of accidental injuries in the studio. In the event that the liquid spilled is flammable or toxic, care should be exercised in its removal and disposal. Rags used to wipe up a spillage of solvent and should be disposed of in a safe manner. Placing them in trash barrels full of paper is not recommended. The immediate disposal of solvent soaked rags is recommended.

TOOLS AND EQUIPMENT, primarily those having the capability of cutting or maiming a student, should not be left unattended. Small power tools have the potential of inflicting serious physical damage if used in an unsafe manner by anyone not familiar with their operation. Sharp instruments (i.e., mat knives or X-actoknives) should not be left out when not actually in use. Also eating and drinking in the studio is not recommended because of the danger of accidentally ingesting harmful substances.

A clean, well-organized studio is a strong deterrent to accidents. Any item that has even a minimum potential for injury should be kept in a specific storage place and be under the teacher's close supervision.

TEN SAFETY RULES FOR ARTISTS AND CRAFTSPEOPLE

1. CHOOSE A STUDIO LOCATION CAREFULLY. It is preferable not to work at home in order to avoid contaminating living quarters and exposing other family members. If one must work at home, he/she should have a separate area for work. No work should be done in the kitchen nor should kitchen utensils be used because of the danger of contaminating food. All materials must be kept out of children's reach.
2. USE THE LEAST TOXIC MATERIALS OR PROCESSES POSSIBLE. In many cases, it is possible to substitute less toxic solvents such as acetone, denatured alcohol, mineral spirits (odorless paint thinner), or turpentine for more toxic solvents like the chlorinated hydrocarbons (e.g., methylene chloride, perchloroethylene) and aromatic hydrocarbons (e.g., toluene (toluol), xylene (xylol), benzene (benzol), and lacquer thinners). Often one can use less hazardous techniques. For example, ready-made paints can be used rather than mixing materials and handling toxic dusts which can be inhaled. It is also preferable to use wet grinding rather than dry grinding techniques.
3. READ ALL LABELS CAREFULLY. Warnings and precautions on the labels of art materials usually satisfy the minimum requirements of the law. Unfortunately, even these legal minimums are often not met. If one is in doubt, he/she should call the company or the Art Hazards Information Center for more information.
4. STORE MATERIALS SAFELY All containers should be labeled, and metal or plastic containers rather than breakable glass containers should be used. Do not use coke bottles, milk cartons, etc. which might tempt a child to drink the contents, or might cause adults to drink by accident. All containers not in use (even if only for a minute) should be covered.
5. HAVE PROPER VENTILATION. An open window or door is not adequate ventilation for all but the smallest amounts of toxic solvents or gases. It is safer to use a window exhaust fan. Even better is a local exhaust system which traps the contaminated air and exhausts it before it gets into the room (e.g., a spray booth or vacuum attachment). In addition one should make sure to have an adequate supply of replacement air that contaminated air can't re-enter and should also set up the exhaust system so that fresh air flows past the face before being contaminated and exhausted.

6. **WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT.** This rule includes wearing gloves to prevent skin contact with irritating chemicals; wearing proper types of goggles to protect against splashes in the eye, flying particles, or harmful ultraviolet or infrared radiation; wearing the proper type of air-purifying respirator or dust mask to protect against inhaling toxic materials; and wearing protective clothing (e.g., hair coverings, aprons, overalls, long sleeved shirts, etc.) which can be removed after work. One should make sure that all goggles or respirators are approved for their particular purpose.
7. **HANDLE FLAMMABLE MATERIALS SAFELY.** Flammable solvents should be stored in approved safety containers. Do not smoke or allow open flames, sparks, etc. near flammable materials. Use explosion-proof fans with flammable solvents. Dispose of all flammable solvents or solvent-soaked rags in approved waste disposal cans which are emptied each day. Have the proper type of fire extinguisher on hand for the materials that are being used.
8. **WATCH OUT FOR PHYSICAL HAZARDS.** Hair should be tied back. Do not wear loose clothing, ties, beads, etc. which might get caught in the moving parts of machinery. When using sharp tools one should cut away from himself/herself and put the hand that is free behind or to the side of the tool, not in front. Make sure all electrical equipment is adequately grounded and that the wiring is in good repair.
9. **CLEAN UP CAREFULLY.** Clean up spills immediately. Vacuum or wet mop dusts; do not sweep, since this just stirs up the dust. If chemicals must be poured down the sink (e.g., acids, water solutions, water-soluble solvents), do so slowly--flushing them at the same time with lots of water. Disposal of chemicals must adhere to the Kansas Department of Health and Environment, Division of Environment, Bureau of Environmental Sanitation regulations contained in Section XIII--hazard Chemicals. Do not mix chemicals since this might cause the formation of toxic gases; it might even cause explosions or fire, in some instances.
10. **USE PROPER PERSONAL HYGIENE PRECAUTIONS.** Don't eat or smoke in the studio because of the danger of accidental ingestions. Wash off immediately with lots of water. In case of eye splashes one should rinse eyes for at least 15 minutes and call a doctor. Wash the hands with soap and water or a safe, waterless hand cleanser (no solvents, alkali, or harsh abrasives). Never use solvents to wash the hands.

LEATHER DYES

MOST LEATHER DYES ARE BENZIDINE-BASED. Benzidine is a carcinogen. Exposure to benzidine-based dyes is being controlled in industry. (OSHA Instruction CPL 2-2.27). Teachers must protect pupils from direct skin contact by explaining the hazard and providing protective gloves. The use of water-based dyes also requires protective gloves. (see the Glove Selection Chart in Section X of the handbook)

LEATHER DYES WHICH ARE NOT WATER-BASED also require ventilation. (Refer to Ventilation Unit in Section XI--Health and Environmental Controls.) Leather dyes containing benzene (benzol) should not be used in public schools (See Section XIII--Chemicals.)

OTHER LEATHER PRODUCTS (INCLUDING STAINS AND FINISHES) contain aromatic solvents, mineral spirits, and certain chemicals which require special ventilation. Read the labels carefully.

RUBBER CEMENT used as an adhesive for leather often contains toluene. Benzene-based rubber cement should not be used. Toluol-based rubber cement should be used with caution. Toluene is the "glue-sniffing" chemical misused by pupils to induce euphoria. Toluene does damage to the central nervous system.

The tanning process uses hazardous chemicals, including benzene. Craftspeople handling leather on a long term basis may develop a sensitization.

METAL SMITHING

SOLDERING AND BRAZING

These techniques fall under the category of joining metals by heat. However, instead of melting the metals to be joined (as in welding), a third metal of lower melting point is used to join them.

In soft soldering, the temperatures are below 700° and tin/lead solders are used. At these temperatures, there is little hazard from lead vapors unless a person spends long periods of time soldering on a regular basis and has his/her face close to the point of soldering. The fluxes produce very irritating gases, especially zinc chloride and acid fluxes. For these reasons, there should be good ventilation. Brazing (hard or silver soldering) is much more hazardous because of the higher temperatures.

In addition, some solders contain other toxic metals, such as cadmium. Cadmium fumes can cause severe lung and kidney disease and even death. Many low-melting, easy-flow silver solders contain substantial amounts of cadmium. These are supposed to be labeled as containing cadmium but usually aren't. Fluoride fluxes, often used with silver solder, are highly toxic if inhaled.

SULFURIC ACID, sometimes called "pickle," is used to clean oxidized surfaces of metal after soldering. Use great caution with acids. Always add the acid to the water, never the reverse. Do not inhale the dry acid dust. When acid and water are mixed, heat is produced, which causes explosive splattering. Use tongs to retrieve the work being done. Drops of acid on the clothing will cause holes. One should lower the piece of work into the solution on the near side so the splashes will move away from him/her. Move away from the acid bath until the fumes are dispersed. Rinsing the piece of work in water will lessen the amount of splash. Sulfuric acid is a strong irritant to body tissue.

NITRIC ACID is used to strip firecoat or firescale off metal surfaces. It is highly toxic when inhaled. It is also harmful to skin and mucous membranes.

CASTING

BORAX is used as a flux when casting. It is usually in dry powder form. When it is thrown on the molten metal, fumes are produced. Good ventilation is required for this procedure. Overheating of bronze or brass can also occur in casting. This will vaporize the zinc content. One must not inhale these zinc fumes.

CASTING (continued)

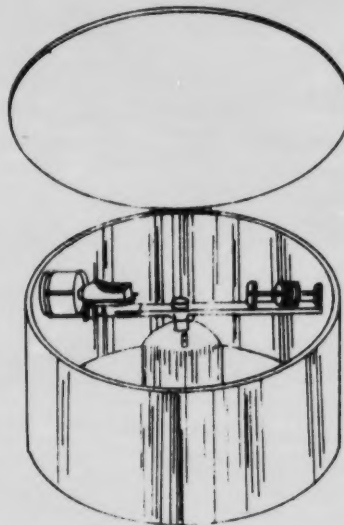
INVESTMENT is a plaster-like material used to create an outer mold for lost-wax casting. It sometimes contains asbestos (a carcinogen). Do not use investment containing asbestos. Direct modeling of hard wax (for casting mold) may be done with any of several types of wax. It is important to determine the content of the product to be used. Wax is vaporized when the sleeves (investment molds) are heated in a kiln for a burnout. Molten wax creates acrolein type fumes. Therefore, ventilation is required.

CENTRIFUGAL CASTING

This method of casting has a high potential for physical injury because it involves the handling of molten metal which gives off toxic fumes, and also presents the danger of molten metal being ejected from the crucible during the casting process.

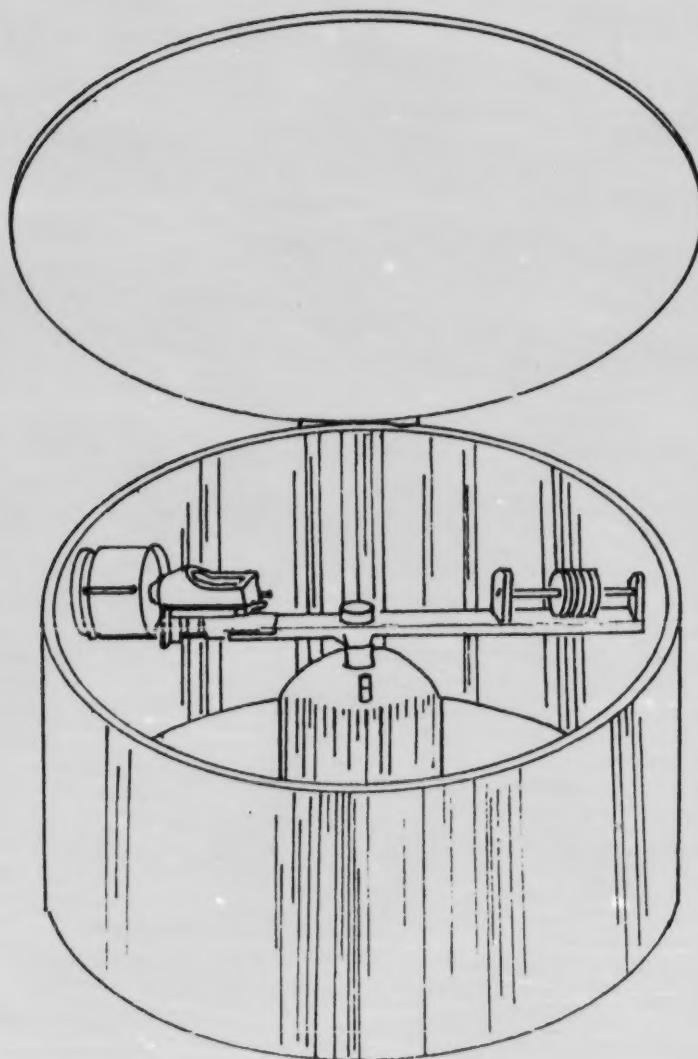
In centrifugal casting, the artist must wear the proper safety clothing. This includes a heat-resistant face shield that extends below the chin, a heavy leather apron with a high bib or fire resistant smock, and heat resistant gloves.

The casting machine must be within a metal enclosure that extends a minimum of four inches above the casting arm. The enclosure must be equipped with a lid that can be rapidly lowered during casting. The caster must be placed in an area away from the rest of the work area.



CENTRIFUGAL CASTER WITH SAFETY ENCLOSURE AND SAFETY LID

CENTRIFUGAL CASTER WITH SAFETY ENCLOSURE AND SAFETY LID



BUFFING

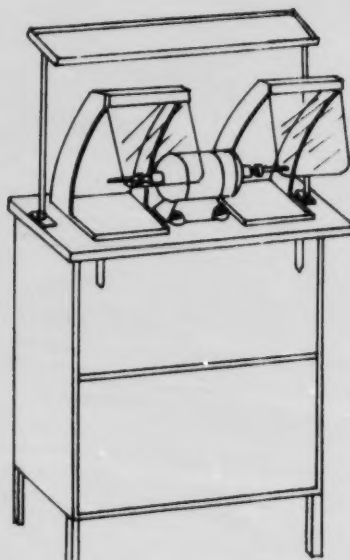
Buffing requires a variety of safety precautions. A primary safety factor involves the use of a shatterproof shield which covers the buffing wheel. If the wheel is not equipped with a safety shield, the operator must wear a shatterproof face mask that covers the entire face.

When operating buffing equipment, the artist must be sure that long hair is tied back to prevent entanglement with the shaft of the buffing wheel. There have been many cases of injury due to long hair wrapping around the buffer shaft thus causing facial and scalp injuries.

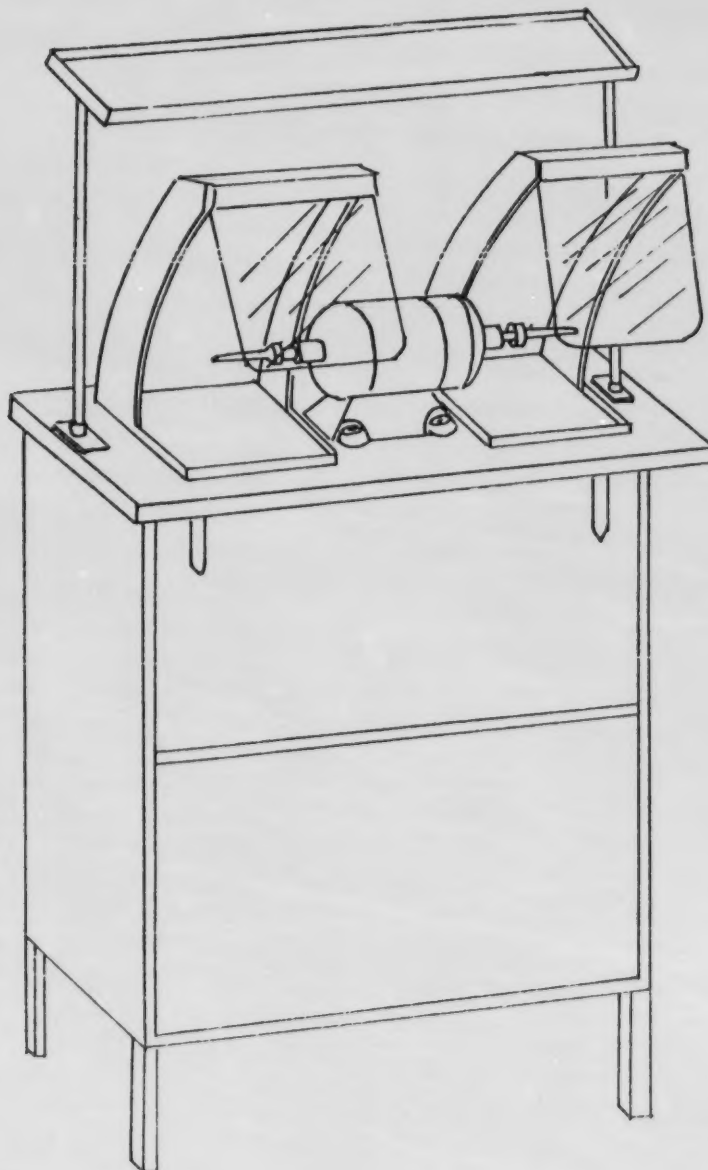
Metal builds up heat during the buffing process and often becomes too hot to handle with bare hands. To prevent minor burns to the arms and hands, heavy cotton gloves or lightweight leather gloves should be worn. The gloves should have gauntlet tops to cover the lower part of the arm.

All buffers must be equipped with a dust collecting system that includes a filter. This prevents the operator from inhaling the dust and minute metal particles that are released into the atmosphere during buffing. If the buffing process requires a continuous, extended period of time, the operator must wear a respirator.

BUFFING MACHINE WITH SAFETY SHIELDS AND DUST COLLECTOR



BUFFING MACHINE WITH SAFETY SHIELDS AND DUST COLLECTOR



METAL HAZARDS *

MATERIAL	RESULT OF OVEREXPOSURE	TYPE OF EXPOSURE
Cadmium	Avoid all contact. Exposure can result in death.	Inhalation
Cobalt	Allergenic. Can result in severe rash and/or lung reaction.	Inhalation Skin Absorption
Magnesium	Allergenic. Can cause severe blistering	Inhalation Skin Absorption
Manganese	Affects the central nervous system. Can cause drowsiness, weakness, emotional disorientation, uneven gait or paralysis.	Inhalation Skin Absorption
Nickel	Affects the mucous membranes. Fumes from welding nickel produce nickel carbonyl, which is highly toxic.	Inhalation Skin Absorption
Silver	Compound forms affect the mucous membranes. Skin irritant.	Inhalation Skin Absorption
Beryllium	Avoid all contact. Exposure can result in death.	Inhalation
Copper	Affects the central nervous system resulting in severe headache, cramping, and fever.	Inhalation
Lead	Extremely toxic. Can result in poisoning. Affects the central nervous system. Anemia may result.	Inhalation Skin Absorption
Asbestos	Avoid all contact with fibre. Can result in cancer or severe lung disorders.	Inhalation
Carbide	Can result in lung damage. Primary exposure is through a grinding operation on metal.	Inhalation

METAL HAZARDS (continued)

MATERIAL	RESULT OF OVEREXPOSURE	TYPE OF EXPOSURE
Sodium Bisulfate	Avoid skin contact. Can cause skin eruption. Affects the mucous membranes of the eyes, nose, and throat. Used in pickling solutions	Inhalation Skin Absorption
Nitric Acid	Primary lung irritant. Affects mucous membranes. Used in etching metal.	Inhalation
Styrofoam	Can affect the central nervous system. Causes severe headache and nausea. Primary exposure is through burnout procedures in casting.	Inhalation
Acetylene	Can cause mild narcosis. Affects the central nervous system.	Inhalation

(*Safe Practices in the Arts and Crafts A Studio Guide, Pub. College Art Association of America)

PAINTING

Artists are fully aware that lead pigments are inherently dangerous due to the wide publicity that has been given to these types of pigments. There have been many warnings that lead pigments in powdered form should not be handled because of the high risk of inhalation and accidental ingestion. Lead pigments in any form are dangerous and should be handled with caution; including a thorough washing of the hands and a careful check of the fingernails.

"Many artists are, however, not aware that many other pigments in common use are also very toxic due to the presence of other toxic metals. Inhalation or ingestion of these can also lead to chronic poisoning, and similar precautions should be taken with such pigments. In particular, the habit of pointing a brush with the lips can result in the ingestion of hazardous pigments. Chrome yellow (lead chromate) and zinc yellow (zinc chromate) powders may cause lung cancer if inhaled. Cadmium pigments may cause kidney damage and prostate cancer.

Other pigments besides ones containing heavy metals can be hazardous. Lamp black, for example, can cause cancer upon repeated skin contact. In addition, the toxicity of many of the modern synthetic pigments is unknown. Some of the metallic dryers used with pigments are also toxic because they contain lead or manganese. Cobalt linoleate is the least toxic dryer." (Health Hazards Manual for Artists)

As a general rule, it is recommended that any vehicle or pigment with unknown toxicity be handled with care. It is far wiser to use sensible precautions than risk any type of physical damage. It should be a firm rule in any studio situation that no food or drink be allowed.

TOXIC PIGMENTS

The list of toxic pigments that the artist would normally be involved with in painting is small. However, the number of colors containing these pigments is more extensive.

ANTIMONY--Overexposure will result in eye inflammation, nasal irritation, perforated nasal septum, anemia, and irritation of the digestive tract, with a possible development of ulcerated intestines. Is present in the color true Naples yellow.

TOXIC PIGMENTS(continued)

ARSENIC--Is present in emerald green, cobalt blue, and cobalt violet. May damage the kidneys, cause skin irritation, and affect the nerves of the hands and feet, creating numbness. There is evidence that over-exposure may result in anemia or lung cancer.

CADMIUM--A known carcinogen which also has the potential of causing severe kidney damage as the result of overexposure. Is present in all cadmium colors.

CHROMIUM--Is included in chromium oxide green, zinc yellow, yellow, viridian green, and chrome yellow. Chromium is primarily a skin irritant.

LEAD--Is a suspected carcinogen and kidney toxin and can affect the central nervous system. Pigments that have lead properties are: flake white, all mixed whites, true Naples yellow, and chrome yellow.

MANGANESE--Will create (with prolonged exposure) drowsiness, emotional disorientation, erratic movement, and weakness--as a result of affecting the central nervous system. Manganese is present in manganese blue, manganese violet, burnt umber, raw umber, and Mars brown.

MERCURY--Is included in the colors vermillion and cadmium vermillion red. It is considered a highly toxic substance. Even in small quantities it can be fatal, if ingested. It can also result in birth defects and a variety of central nervous system disorders.

VEHICLES

AMMONIA is used in some of the acrylic emulsions and can cause irritation to the eyes, nose, and throat. For the most part, the binders used in media such as gum, drying oils, and casein are nontoxic. Quick lime is an exception. It is an irritant, and inhalation of quicklime dust should be avoided.

VINYL RESINS, VINYL, AND ACRYLIC VINYL are nontoxic, as are pre-mixed polymer colors, which are water emulsified. However, it should be kept in mind that some of the pigments in acrylic are toxic. Some forms of acrylic polymer paints contain a mercury-based preservative, and chronic ingestion of such paints by tipping or pointing a brush or through poor hygiene can cause mercury poisoning.

VARNISHES--In varnishes, the solvents are the major hazard. The various solvents used include methyl alcohol and ethanol(shellac varnish), turpentine(damar, mastic, and cooked oil-resin varnishes), and the lacquer solvents used with pyroxylin (nitrocellulose) and other synthetic resins. The major hazard in lacquer thinners is due to the presence of toluene and xylene.

PRECAUTIONS FOR ELEMENTARY AND SECONDARY ART TEACHERS

Teachers are concerned that some art materials may be threatening the health of elementary and secondary school children. Since children have a greater susceptibility to toxic materials than adults, art teachers must be very careful. Many materials with a nontoxic label may contain toxic materials. Products with the Crayon, Watercolor, and Craft Institute CP (certified product) or AP (approved product) seal are probably safer than products without this seal, especially in terms of immediate poisoning.

Children can absorb toxic materials into their bodies by the inhalation of dusts, sprays, or solvent vapors. These toxic materials can affect the respiratory system, causing lung cancer, asthma, or emphysema. Another way to absorb materials is through ingestion. For example, this can happen through children putting colored pencils and paintbrushes in their mouths, or through cuts and infections in the skin. The art room should be kept very clean. It should also have good ventilation, with constant supply of fresh air.

Children may be allowed to use more advanced techniques if the proper precautions are taken.

1. Teach the pupils the hazards encountered with art materials and the precautions that need to be taken.
2. Have good ventilation in the art room, with a constant supply of fresh air.
3. Wear the proper protective clothing, aprons, gloves, and goggles.
4. Clean the work area during and after each use of art materials.
5. Store solvents in their own containers (not in food containers or soda bottles). Label all materials carefully.
6. Do not grind toxic pigments. Use prepared paints only.
7. When using power equipment, inspect the cords and plugs. Make sure the equipment is properly grounded.
8. Do not use lead glazes or lead frits. Many non-lead glazes are available.
9. Fumes and gases from all kilns are dangerous. Kilns should have the proper ventilation. (Artist Equity Association)

PRINTMAKING

PRINTMAKING requires a large variety of chemicals, and it is important that there is an awareness of the hazards involved in handling chemicals and what steps should be taken to prevent physical injury. The body has natural defenses against many of the toxic substances handled by the printmaker, but beyond a given point those defenses break down and physical damage begins. For the teacher, it is important to realize that the defenses of young children are not as great as those of an adult. Therefore, the level of exposure must be lower.

CHEMICALS, generally speaking, handled by the printmaker can cause, with overexposure, damage to the skin by defatting and dermatitis; to the eyes, nose and throat by deterioration or perforation of the mucous membranes; and to the central nervous system by depression. Most safeguards involve the use of barrier creams or proper gloves; a ventilation system designed to remove the particulate and vapor from the area; and, whenever needed, the use of goggles, face shields, or safety glasses. Consult Section XIII--Chemicals.

ACIDS used in printmaking constitute a major hazard to the skin and eyes, especially in concentrated form. In addition, many of the acids present an inhalation hazard. The acids used in intaglio printing are most hazardous in concentrated solutions, and it is of extreme importance that care be exercised in every aspect of their handling. The mixing as well as the etching must be done under local exhaust ventilation, and the etching area should include some provisions for the acid trays. This will prevent the acid vapors from entering the atmosphere and will reduce the risk of acid splashing. Acid-resistant gloves should always be worn when handling etching acids and plates that have been immersed in acid.

PHOTO RESISTS require the same safety procedures employed in other areas of printmaking. The chemicals used in the process include xylene, which is a component of the developer; and the resist contains inorganic chromate, which is extremely toxic.

OPEN FLAMES in the printmaking area should not be used, as the possibility of explosion and fire always exists where there is use of solvents and other flammable substances. The preparation of grounds which include various mixtures of asphaltum, grease, beeswax, resins, and solvents should be done with the use of an approved electric hot plate. The same procedure should be employed in heating aquatint. Although this method of heating is somewhat slower, it is safer.

AQUATINT BOXES should be made of wood or other materials which include no metal. The high concentration of dust particles creates the risk of explosion. The use of metal in the construction of the box may result in the creation of friction or sparks. An explosion-proof motor should be used if the box is motorized.

Most METHODS OF SCREEN PRINTING require the use of large quantities of solvents which are included in the inks, thinners, bases, and screen cleanups. As in any other method of screen printing, good housekeeping and sensible precautions should be observed. The components in some of the pigments used in all types of printmaking include cadmium, barium, arsenic, lead, cobalt, antimony, chromium, manganese, mercury, and selenium. All of these metals are considered toxic. Metal salts are also present in the driers used with these inks. Care should be taken to prevent the accidental ingestion of pigments and absorption through the skin. Gloves should be worn when mixing pigments and during the cleanup process. Wearing clothing covered with ink is an unnecessary physical risk.

Allowing the ink to dry in the screen and squeegee requires larger amounts of solvent in the cleanup process and should be avoided. It is not only poor housekeeping, but also creates a greater physical hazard. In the event that a more powerful solvent must be used, it is recommended that acetone be used. Although acetone has a stronger odor and is more flammable, it is less toxic than lacquer thinner.

SOLVENT STORAGE AND DISPOSAL (Refer to Section XIII-Chemicals)

1. The storage of solvents used in printmaking is of prime importance to the printmaker. All solvents must be stored in a flameproof metal cabinet that should be locked to prevent unauthorized and uncontrolled access.
2. The storage of solvents in glass containers does not provide adequate safety and should not be permitted. It is a good idea to identify the solvents by name, and by a system of color coding which would indicate the level of toxicity. Solvent cans should be tightly capped when not in use to prevent evaporation into the atmosphere.
3. In the printmaking area, solvents should be kept in clearly-marked safety cans that are equipped with spring-loaded caps. A designated area should be set aside for clean-up. The practice of using solvent-soaked sawdust as a plate cleaner should not be allowed, as it constitutes an extreme fire hazard and is constantly releasing vapor into the atmosphere. All rags and other solid wastes that have been saturated with solvent must be disposed of in safety disposal containers because of the high risk of spontaneous combustion. These containers are made of metal and are equipped with lids designed to be self-closing.

STORAGE AND SUPPLY ROOM

STORAGE -- ART SUPPLIES AND EQUIPMENT

The storage of art materials and equipment is an area of prime concern for the teacher. Adequate provision should be made for the safe and efficient storage of all materials and equipment.

1. As a general rule, paper and cardboard that are bulk packaged should be stored on lower shelves to prevent back and abdominal injuries resulting from attempting to lift weights beyond the capabilities of the pupils and teacher.
2. Loose materials should not be stored above eye level because of the possibility of receiving head and eye damage. One of the greatest dangers is loose paper which can cause serious eye damage. Any item that has great weight should be stored at a lower level. Whenever possible, an effort should be made to reduce the weight of such packaging by separating the material into smaller quantities for easier handling.
3. The storage of flammable solvents and toxic chemicals should be separate from other art materials. A flameproof metal cabinet designed to hold combustible materials is highly recommended. Every effort should be made to insure that inadvertent or unauthorized use of flammable or toxic substances be eliminated. The incidents of physical injury in this area can be totally eliminated if the teacher has complete control of the materials. Consult Section XII--Hazardous Materials.
4. The storeroom or supply room should be checked to see that nothing protrudes beyond the shelves in a manner that could jeopardize the movements of pupils or teacher within the storage room. The floor should be kept clear of all obstacles that could in any manner create a safety hazard.
5. All liquids and any substance or material not readily identifiable should be clearly labeled, and those that are toxic should be so labeled. Toxic chemicals should not be transferred from their original container to any other type of container unless adequate provisions have been made for clear, concise labeling; and the container has been deemed safe for the storage of the liquid or substance in question.
6. All storage shelves should be securely anchored to the wall to prevent tipping and should not be overloaded in a manner that could cause the shelves to collapse. Glass containers should be stored as close to the floor as possible to prevent high impact shattering. Whenever possible and practical, liquid packaged in glass should be transferred to a nonbreakable container.

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Materials were selected and reviewed from the following sources, and in some instances were incorporated in the production of the preceding unit.

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HOME ECONOMICS EDUCATION

CHILD CARE

Home Accidents Fatal to Infants

Fire Kills Hutch Girl While Mother Is at Work

**2 Chicago Girls
Drown in Bathtub**

**Windows
A Threat
To Young**

**4-Year-Old Boy
Dies When Run
Over by Car**

**Child on Lap
In Jeopardy,
Insurers Say**

**Boy, 18 Months, Drowns
In Bathtub at His Home**

**Boy, 3, Dies
After Tumble
On Steel Rod**

Bathroom accidents account for 3% of all home accidental deaths. 200,000 more accidents per year that resulted in nonfatal injuries.

It is estimated that each year more than 1 million children are accidentally poisoned. Many are seriously injured, many die, and most are under 5 years old.

Every year 250,000 disabling injuries occur when people fall on stairs.

It is estimated that 100 children die yearly and 30,000 endure symptoms caused from lead paint poisoning.

10,000 children are treated in hospital emergency rooms yearly from insecticide/pesticide poisonings.

Last year 150,000 children were treated for injuries caused by toys.

CHILDREN AND APPLIANCES: REFRIGERATOR/FREEZER STORAGE

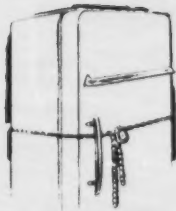
PREVENTING ENTRAPMENT

1. Supervise child's play.
2. Advise child of entrapment dangers.
3. Follow discardment precautions (below).
4. If you find discarded appliances, follow these precautions or remove the danger.

WHEN YOU WANT TO STORE A REFRIGERATOR OR FREEZER THAT WILL BE USED AGAIN...



1. Completely remove the door(s).



2. Chain, padlock or tape door(s) closed.

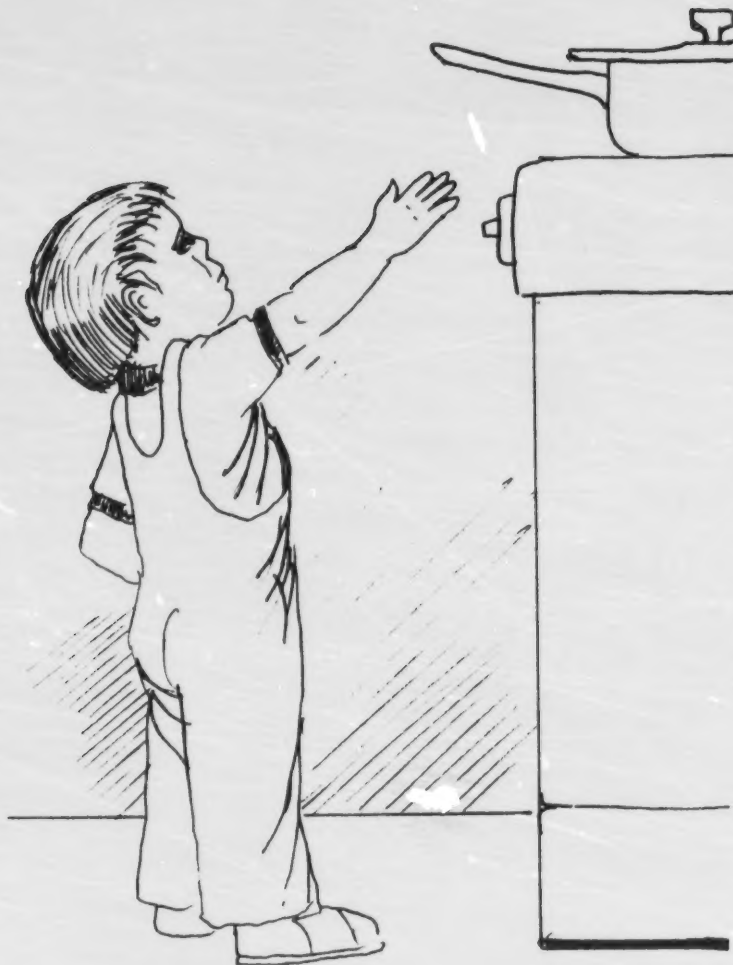


3. Remove or modify the latch.



4. Use stops (rubber or wood) to prevent the door(s) from closing completely.

CHILDREN AND APPLIANCES: STOVES



The safest rule is to teach children to stay away from stoves.

OTHER PRECAUTIONS

1. Never allow children to lean or climb on the stove.
2. Always turn pot handles away from edge of stove.
3. Do not store any child desired item(s)
(cookies, candy, etc.) above the stove.

CHILDREN AND AUTOMOBILES

Automobile accidents are the greatest cause of death to children under the age of five. Follow these precautions:

1. Provide a suitable infant car seat for best protection.
2. Do not hold baby on your lap when the car is in motion.

Other precautions to follow to prevent accidents with automobiles:

3. Never drive over cartons or leaves where children might hide.
4. Obey traffic laws and drive safely.
5. Do not let children stand in a moving vehicle.
6. Do not let children put hands or arms out the windows.
7. Teach children how to cross the street safely.
8. Do not allow children to play in the street.

CAR SEATS

NEWBORN TO 20 LBS.

Use a well padded, firmly constructed infant seat that secures to the car structure with a seat belt. The seat should be designed to stay parallel to the regular seat and preferably face backwards.





20 LBS. TO 50 LBS.

A well padded safety seat will provide protection from head-on, side and rear collisions. Make certain it is designed to be secured in place with an adult lap belt. Check that all the areas your child's head may touch are lined with padding and that there are no sharp or pointed edges anywhere on the seat. Reject models made with toy steering wheels. To protect the upper part of the body, the seat should incorporate an impact shield or restraining belts at least 1-1/2 inches wide. Also look for features that protect against whip-lash injury.



LARGER AND OLDER CHILDREN

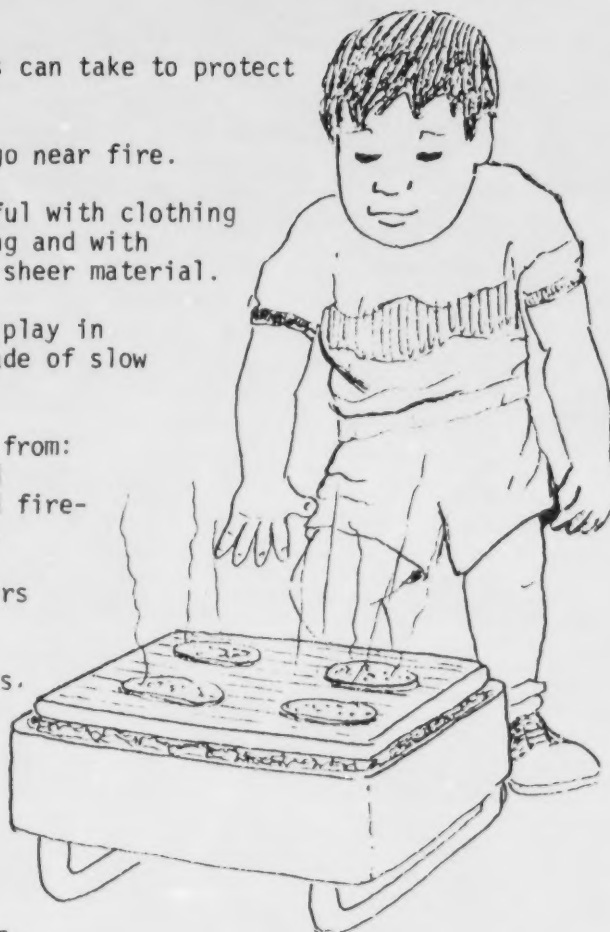
When your child outgrows the safety seat, install a lap belt that buckles firmly against the hips (not over the abdomen). If necessary, place a hard cushion under him to keep the belt low enough and allow him to see out the window. If the child is more than 4-1/2 feet tall, also use a shoulder harness. A 3-point lap and shoulder belt offers maximum protection.

CHILDREN AND FIRE

Precautions that adults can take to protect children from serious burns.

1. Never let a child go near fire.
2. Be especially careful with clothing that is full flowing and with fluffy garments of sheer material.
3. Dress children for play in clothing that is made of slow burning fabric.
4. Keep children away from: stoves, unprotected heaters, unscreened fireplaces, and grills.
5. Instruct baby-sitters thoroughly on precautions and emergency procedures.
6. Make sure the family knows what to do if clothing catches on fire. (See additional information in this section.)
7. Buy flame resistant fabrics and clothing when possible.
8. Follow care instructions for flame resistant fabrics to protect and prolong the garments flame resistant life.
9. Store flammable liquids in well ventilated area, away from flame source and out of sight and reach of children.

See additional information in this section.



Children and the Home: Doors/Windows

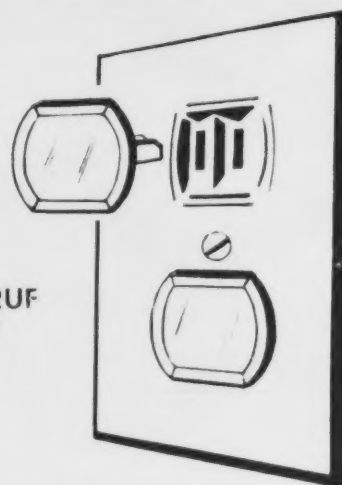
(See additional information this section)

Children and the Home: Electricity

Precautions to follow in order to protect children from electrical shock and electrical accidents.

1. Cover unused outlets with plastic safety caps.
2. Insert plugs firmly and completely into sockets.
3. Do not cover ventilation holes on electrical products.
4. Teach children to never touch electrical appliances with wet hands or standing on a damp surface.
5. Unplug power tools immediately after using and store in a safe place, out of reach of children.
6. Do not overload circuits by using multiplier plugs.
7. Do not run cords under carpets or twist over nails.
8. If appliance gives a tingling sensation when touched, unplug it and have it checked before using again.
9. Teach children not to play with cords and outlets.
10. Wherever possible, use outlet covers.

SHOCK-PROOF
SAFETY
CAPS



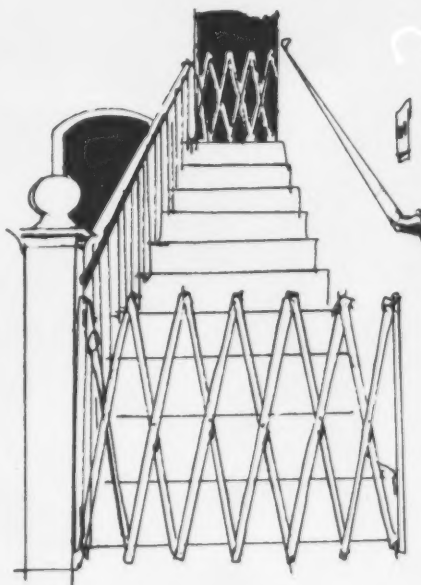
SHOCK GUARD OUTLET COVER

Children and the Home: Stairs

Important factors in making stairways safe for children are:

1. All steps should be the same measure.
2. Provide good lighting with switches at the bottom and top of stairs.
3. Paint the edge of each step or paint a white patch on the floor above the highest step and below the lowest step.
4. Balusters should be no more than 4 inches apart.
5. Avoid single steps
6. Install a handrail on each side of stairway:
30-33 inches above treads, lower for children
2-3 inches from the wall for a good grip
No more than 2 inches in diameter for child's grip.
7. Install folding gates at both the top and bottom of stairs.
8. The stair surface should never be slippery.
9. Stair carpeting should fit snugly.
10. Do not use throw rugs at either the top or the bottom of stairways
11. Keep stairs clear at all times.
12. Teach children not to run on stairs.

(See additional information in this section.)



Children and Playtime: Playgrounds and Equipment

It is estimated that more than 160,000 individuals are injured annually in accidents involving public and home playground equipment. Most of those injured are children between the ages of 5 and 10.

What can you do to protect children from accidents on playground equipment?

1. Teach children to use safe habits around equipment.
2. Always supervise young children.
3. Take extra care in buying equipment. Consider these points:
 - . If not fully assembled, make sure there are detailed instructions that are clear and simple to follow.
 - . Check for anchoring devices so equipment will be stable when installed.
 - . Exposed screws, nuts, and bolts should be capped.
 - . Do not buy if it contains open-ended hooks, especially S-hooks.
 - . Make sure it is suited for child's age.
4. Install and maintain equipment properly. Equipment should be:
 - . Installed over grass, sand, or other soft surface, never over or near concrete.
 - . Placed at least 6 feet from obstructions such as fences, walls, outbuildings, etc.
 - . Checked often to make sure bolts and screws are tight.
 - . Checked for rusted areas, then cleaned and repainted if necessary.

Children and Playtime: Safety Procedures for Equipment

LADDERS

Different heights provided
for different ages.
Soft surfaces underneath.
Bars that do not turn when
grasped.
Frame that is secure and
has not shifted.

SANDBOX

Should be shaded.
Free of glass and trash.
Sand is raked often.
Box is covered nightly.
Frame is free of splinters.
Food is not allowed.
Sharp or pointed items
not allowed.

SLIDES

Should be shaded.
Soft and clean surface
at bottom.
Steps and handrails secure.
Climb 1 step at a time.
1 person at a time sliding.
Do not hold onto sides.
Do not slide backwards.

MONKEY BARS

For children 5-12 years only.
Do not use when wet or
slippery.
Soft surfaces underneath.
Bars that do not turn when
grasped.
Frame that is secure and
has not shifted.

SEESAWS

For children under 12.
Do not stand or run on board.
Warn partner before getting
off.
Do not bump the board.
Keep hands and legs from
under the board.

SWINGS

Chair seats for children
under 5.
Seats set at different heights.
All seats should have rubber
bumpers.
Sit in center of seat.
Do not twist swing chains.
Never swing empty seats.
Hold on tightly with both
hands.
Do not swing double.
Never jump off or out of swing.
Do not stand on seat.

Children and Playtime: Safety Checklist for Playgrounds
and Equipment

Before letting a child spend time on a playground, inspect it yourself to make sure it is safe. Ask yourself these questions:

1. Is the area surrounded by fences?
2. Is the equipment arranged according to age groups?
3. Are the age groups separated adequately?
4. Is adequate space provided around equipment so participants and passersby are protected?
5. Are the surfaces around equipment of a relatively soft material to ease falls?
6. Is the area kept clean and cleared of broken glass, pop top metal, and other trash?
7. Is equipment firmly anchored?
8. Has equipment remained level and not shifted?
9. Are bolts and screws capped and do they remain tight?
10. Are metal structures free from rust?
11. Are wooden structures free from splinters and general deterioration?
12. Are there shaded areas where children can play without excess sun exposure?

NINE PLAYGROUND HAZARDS

1. PINCH-CRUSH PARTS
2. SWINGING EXERCISE RINGS
3. OPEN-ENDED "S" HOOKS
4. HARD, HEAVY SWING SEATS
5. SHARP EDGES
6. EXPOSED SCREWS AND BOLTS
7. INADEQUATE SPACING
8. HARD SURFACES
9. IMPROPER ANCHORING

"SOME BARE FACTS ABOUT PLAYGROUND SAFETY"

1. "HOLD ON TO SWINGS WITH BOTH HANDS. STOP BEFORE GETTING OFF."
2. "TWISTING THE SWING CHAINS COULD CAUSE THEM TO BREAK AND YOU COULD FALL."
3. "SIT IN THE SWING--YOU COULD FALL OUT IF YOU STAND UP."
4. "WALK WAY AROUND--NOT CLOSE TO THE FRONT OR BACK--OF A MOVING SWING."
5. "GO UP THE STEPS TO THE SLIDE--IF YOU CLIMB UP THE SLIDE YOU COULD FALL OR GET BUMPED."
6. "BE SURE EVERYONE IS OUT OF THE WAY BEFORE SLIDING DOWN."
7. "BOTH PEOPLE SHOULD HAVE FEET ON THE GROUND BEFORE GETTING OFF A SEESAW."
8. "HANG ON TIGHTLY WHEN CLIMBING--USE FINGERS AND THUMBS."

CHILDREN AND PLAYTIME: SUNSHINE

Although sunshine is pleasant and does provide vitamin D, a child's time in the sun should be supervised. Tender young skin is particularly susceptible to overexposure.

Rules to follow for infants and young toddlers:

1. Limit time in sun to no more than 2 minutes daily.
2. Do not expose to the midday sun. If children are to be in the sun, do so before 10:00 a.m. or after 3:00 p.m.
3. Use preparation for sun protection. Apply often during exposure.



CHILDREN AND PLAYTIME: TOYS

Many serious injuries result from:

1. Children swallowing small parts.
2. Children placing tiny toys in their noses and ears.
3. Exploding gas powered toys.
4. Flammable products.
5. Sharp edges.

Toys that have been banned are:

1. Toy rattles, dolls, stuffed animals, or similar toys containing rigid wires, sharp points, or loose, small objects that could become exposed and cause cuts, punctures, or other injuries.
2. Any toy with parts that could be removed by a child and swallowed or inhaled.
3. Lawn darts and other sharp pointed items sold in a primarily toy oriented store.
4. Caps used in toy guns or toy guns that cause noise above certain levels.
5. Baby bouncers.
6. Clacker balls and such.
7. Electricically operated toys - specifies maximum temperature and reliable electrical construction.
8. Electrical toys must bear a warning level of recommended age.

It is impossible for the government to examine every new toy. So it is left up to the consumer to buy wisely. Ask yourself these questions when purchasing toys:

1. Does it suit the skills and abilities of the child?
2. Check the instructions. Are they easy to read and understand?
3. Does it have a UL label?

4. Are there small parts, sharp edges or sharp points?
5. Is it a loud noise producer?
6. Does it propel objects?
7. Will you be able to help your child understand safe use of the toy?
8. Will you be able to supervise the child while he/she plays with this toy?

Shop with extra care for toddlers' toys. Make sure it:

1. Is too large to be swallowed.
2. Does not have detachable small parts.
3. Is not apt to break easily into small pieces.
4. Does not have sharp edges or points.
5. Has not been put together with easily exposed items.
6. Is not made of glass or brittle plastic.
7. Is labeled "non-toxic".
8. Has parts that won't pinch fingers, toes or catch hair.
9. Has no cords or strings over 12 inches.
10. Has no exposed flames or heat build-up.
11. Has no flimsy wiring.

Buying

When buying a toy, consider how your child might misuse it. Assume he will try to take it apart, taste it, stick his fingers into it, and throw it.

Using

Watch your child play with the toy and satisfy yourself that it is safe for *him or her*. Remember the child's habits and tendencies, and think about how these relate to the potential hazards.

Maintaining

Inspect toys periodically for signs of chipping or breakage. Worn wooden pieces may develop splinters, easily remedied by sanding and repainting.

Make sure that "button eyes" on dolls and teddy bears are securely attached.

Repair electrical toys at the first sign of frayed wiring or other hazardous condition.

Storing

Set aside a place to store toys when they are not in use, and train the kids to put toys away when play is done. Small children should not have access to the toys of older children.

A toy storage box should have a lightweight lid and its own device for holding the lid open so it won't slam shut on the child's neck. The lid should have no protrusions or recessed areas which could make it more difficult for the child to escape should the lid accidentally close. Check the closing device to make sure it won't pinch.

Disposing

Toys that are broken beyond repair should be disposed of out of the sight and reach of children.

CHILDREN AND POISONS

The most common hazardous substances found in the house are:

1. Bleach, ammonia, lye
2. Prescription medicines
3. Aspirin, pain relievers, sedatives
4. Turpentine, paint thinners and removers, gasoline, kerosene
5. Furniture polish
6. Cleaners for stoves, drains, toilets
7. Lighter fluids
8. Insecticides, pesticides, weed killers

POISON PROOF YOUR HOME BY:

1. Keeping no more hazardous substances than is necessary.
2. Keeping all poisons securely stored.
3. Tightly capping cans and bottles.
4. Not leaving hazardous products unattended while using.
5. Storing internal medicines separately from household products.

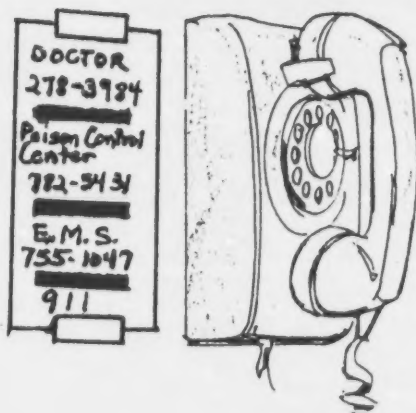
Substances that must now be sold in child resistant packages are:

Aspirin	Turpentine
Furniture polish	Lighter fluids
Oil of wintergreen	Windshield washer solution
All controlled and most	Antifreeze
prescription drugs	Sulfuric acid
Lye, oven cleaners, and	Iron preparation with more
drain cleaners	than 500 mg. of iron

Children and Poisons



If a child swallows or is affected by poison:



1. Find out what the product was.
2. Read the label for first aid instructions.
3. Call a doctor, Poison Control Center or the Emergency Medical Center.
4. Be sure to take poison container with you when going to any of the above.



The safest rule to follow is "Lock Up To Prevent Poisoning."

Children and Playtime: Water

Most children love the water. Since they have little fear of it, the key phrase for children and water is "Adult/Parent Supervision" at all times. A good precaution is that all senior members of the family should be familiar with mouth to mouth resuscitation.

Mouth-to-mouth breathing for infants and small children



1 Clear victim's throat of water, mucus, food, etc.



3 Hold jaw in jutting-out position, keeping lips slightly open with thumb.



5 Open your mouth wide, seal your lips around the child's mouth and nose. (For older child, if you cannot cover both, mouth-to-mouth is preferable but pinch the nose with your fingers.)



2 Tilt head back to open air passage.



4 Keep child in position so that his tongue will not fall back.

Blow into mouth and nose until you see chest lift. Then remove your mouth and let the child breathe out. As soon as you hear the breath come out, repeat the process. Repeat 20 times a minute, or every three seconds. NOTE: For infants, blow only small cheek puffs of air—not deep breaths.

Continue until the child resumes normal breathing or until aid arrives.

Children and Poisons: Household Cleansers



Small children naturally assume that containers in the kitchen hold things to eat and drink. The best rule is to separate potential poisons from food and put them under lock and key. Put them out of sight, out of reach, and out of mind. Keep the area under the sink cleared of these poisons and keep the poisons in their original containers.

Teach children to "always ask first" before eating or drinking anything.

Children and Poisons: Insecticides and Pesticides

SAFETY RULES

1. Purchase safety packaging.
2. Close and store container properly after use.
3. Do not use in presence of children.

PRECAUTION TO FOLLOW

1. Do not store under the sink.
2. Always read the product's warning label for dangers and first aid.
3. Remember that buying a less toxic product may suffice.
4. Do not spread where children and pets may touch or eat.
5. Do not spray near small children.
6. Never spray on playpens, cribs or toys.
7. Cover all food and utensils before spraying.

Children and Poisons: Lead Paint

The most common source of lead paint poisoning is peeling and chipped leaded paint found on windowsills, doors, and walls of older homes. Also, chewing objects covered with lead paint and inhaling lead paint dust during restoration or repair work can result in poisoning.

Lead paint poisoning usually occurs in children from 1 to 6 years of age. If it is not caught it can result in irreversible brain damage and even death.

FOLLOW THESE SUGGESTIONS

1. Examine the condition of painted walls, ceilings, woodwork, windowsills, and doors, especially if children are present in older homes.
2. If painted areas appear to be peeling or chewed on, have the child's blood lead level checked immediately.

3. If restoring or repairing areas that might have lead paint:
 - a. Scrape off, sand and repaint immediately.
 - b. Strip, sand walls, and plaster holes before repainting.
 - c. Keep flakes and chips swept up. Use a damp mop.
4. Prevent inhalation during restoration and repair by:
 - a. Wearing a face mask.
 - b. Using a wet mop to clean up.
 - c. Not eating in the same room.
 - d. Covering plates and utensils so they are not exposed.

Symptoms of children who have lead paint poisoning:

1. Unusual irritability.
2. Poor appetite.
3. Stomach pains or vomiting.
4. Persistent constipation.
5. Sluggishness or drowsiness.

Since January 1973, the United States Government has prohibited the sale of paints that have more than 0.5% lead content for use in homes and on toys.

Children and Poisons: Medicines

Children are curious and can climb. Every medicine cabinet should have a "childproof" section that will lock in all drugs, laxatives, astringents, mouthwash, antiseptics, sleeping pills, alcohol, etc.

PRECAUTIONS TO FOLLOW

1. Buy and use "safety-closure" medicine containers. Never remove medicine from the original container.
2. Never take or give medicine in the dark.
3. Discard leftover prescription drugs by rinsing down the drain or toilet. Rinse out the container and throw it away.
4. Never leave a child alone with medicine.
5. Never call medicine "candy."
6. Don't take medication yourself in the presence of children. Children like to imitate.
7. Remember how important the label is. Read and follow the instructions.
8. Date all medicines when purchased.
9. Never share prescriptions.



Children and Poisons: Plants

PLANTS

*Elephant ear
*Narcissus
*Four o'clock
Columbine
*Cyclamen
*Ivy
*Potato
*Pimpernel
*Oleander
*Lily-of-valley
*Burning Bush
Sweet Pea
*Jimson weed
*Rhododendron
*Dumb cane
Spider lily
*Iris
*Pinks
*Mock orange
*Spanish bayonet
*Bittersweet
*Castor bean
*Foxglove
*Scotch broom
*Bluebonnets
*Tulip
*Mountain laurel
*Monkshood

POISON PARTS

Any
Bulb
Root, seed
Berry
Tuber
Leaves
Seeds, sprouts
Any
Leaves
Any
Leaves
Stem
Any
Any
Any
Bulb
Underground stem
Seed
Fruit
Root
Berry
Seed
Leaves
Seed
Seed
Bulb
Any
Root

*Can be fatal if taken in quantities which a child might eat.

(Refer to Science Education unit in this section for symptoms and toxicology of plants.)

CHILDREN AND SAFETY QUIZ

Name _____

Locate the poisonous part of each plant listed. Place the correct letter in the blank to the left.

- ___ 1. Elephant ear
- ___ 2. Ivy
- ___ 3. Iris
- ___ 4. Bittersweet
- ___ 5. Tulip

- a. Underground stem
- b. Berry
- c. Leaves
- d. Bulb
- e. Any part

TRUE or FALSE

- ___ 6. Children assume that containers in the kitchen hold things to eat and drink.
- ___ 7. If a toy is sold in a reliable store, you as a consumer can assume it has been tested by the government and found to be safe.
- ___ 8. Inspect toys periodically for signs of chipping or breakage.
- ___ 9. When taking children out into the sunshine it is best to do so during the midday hours.
- ___ 10. All senior members of a family with small children should be familiar with mouth to mouth resuscitation.
- ___ 11. Name 3 things that should be done to poison proof your home.

- 1) _____
- 2) _____
- 3) _____

- 12. When you want to store a refrigerator or freezer that will be used again, what 4 things can be done so it will not become an entrapment for a child?

- 1) _____
- 2) _____
- 3) _____
- 4) _____

- 13. List 2 precautions to follow to prevent children from having accidents involving the stove.

- 1) _____
- 2) _____

- 14. How far apart should balusters be on stairs? Why?

- 1) _____
- 2) _____

- 15. Unused outlets should be covered with _____.

- 16. What is the greatest cause of death to children under the age of 5? _____

- 17. List 3 potential fire hazards that children should be kept away from:

- 1) _____
- 2) _____
- 3) _____

- 18. Which of the following is a symptom(s) of a child who is suffering from lead paint poisoning?

- 1) Persistent constipation
- 2) Poor appetite
- 3) Unusual irritability
- 4) Vomiting
- 5) All of the above

CHILDREN AND SAFETY QUIZ ANSWERS

1. E
2. C
3. A
4. B
5. D
6. TRUE
7. FALSE - It is impossible for the government to test every new toy.
8. TRUE
9. FALSE - The midday hours provide the most intense heat and thus are the most harmful.
10. TRUE
11. Keep only necessary amounts. Keep securely stored. Tightly cap bottles and cans. Do not leave substances unattended. Store separately from foods.
12. Completely remove door(s). Chain, padlock, or tape door(s) closed. Remove or modify the latch. Use rubber or wood stops to prevent closing completely.
13. Teach them to stay away from stove. Never allow them to lean or climb on stove. Turn pot handles away from edge. Do not store child desired items above stove.
14. 4 inches, so child can not fall through.
15. Plastic safety caps.
16. Automobile accidents.
17. Stoves, unprotected heaters, unscreened fireplaces, and grills.
18. All of the above.

CLOTHING

Flammable Fabrics

Accident patterns associated with flammable fabrics:

1. Playing with, or using, matches and lighters.
2. Using flammable liquids.
3. Using kitchen ranges.
4. Smoking in bed.

Frequent ignition sources:

Space heaters	Fireplaces
Bonfires	Coal/Wood burning stoves
Candles	

The involvement of clothing usually increases the severity of body burns.

Select Fabrics for Flame Resistance.

1. Look for "Flame Retardant" or "Flame Resistant" on labels when you buy clothing, especially for children.
2. If you sew, shop for flame retardant fabric that is used in clothing you make.
3. Be aware of which fabrics are not flame resistant and are more likely to ignite and burn than those that are slower to ignite and burn.
4. Even the style can affect a garments potential for burning. Make yourself aware of these styles.
5. Care for the flame resistant fabric properly. Follow the care instructions on the label.



Clothing: Flammable Fabrics Standards

A Federal flammability standard has the force of law. It:

1. Specifies how a product must perform in order to provide protection.
2. Sets up tests that a product must pass before it is allowed on the market.
3. Tells how a product must be labeled for safety.
4. Has an effective date after which all products manufactured or imported must meet the requirements.

Carpets and Rugs Standard.

1. Any carpet with a surface area greater than 24 square feet must be able to pass this test.
2. Seven out of eight 9" x 9" samples which are exposed to a burning tablet in the center of the sample must not char more than 3" in any direction.
3. All large carpets and rugs must be labeled with the letter "T" if a flame retardant treatment has been applied.
4. All carpets manufactured after 1971 must be able to pass this test.
5. Any small carpet (under 24 sq. ft.) that cannot pass this test may be sold but must be labeled:

Flammable: Should Not Be Used Near
Surfaces of Ignition

Mattress Standard.

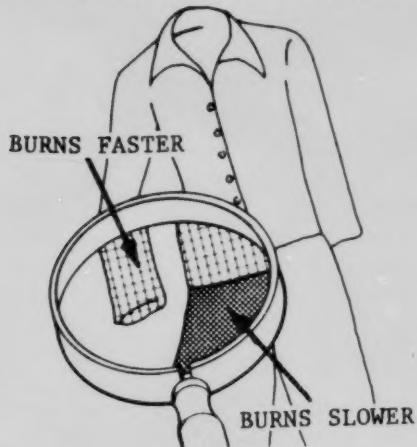
1. All mattresses manufactured since December 22, 1973 must be able to pass the test.
2. Mattress surfaces are exposed to a minimum of 9 burning cigarettes and the char length be not more than 2" in any direction.
3. Two-sheeted tests are also conducted with a minimum of 9 burning cigarettes placed between the sheets.
4. Mattresses meeting the standard are not required to have a label, but may if manufacturer so desires.
5. Mattress pads must also pass the test.

Children's Sleepwear Standard.

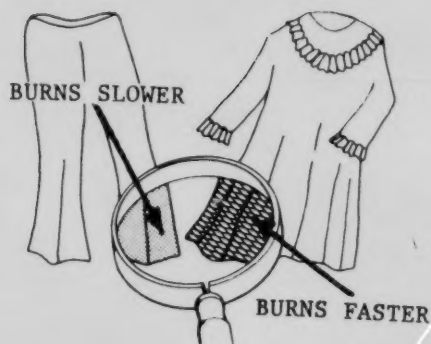
1. All children's sleepwear, sizes 0-6X, manufactured after July 29, 1973, and children's sleepwear, sizes 7-14, manufactured after May 1, 1974 must pass the test.
2. Includes any garment intended to be worn primarily for sleeping or for activities related to sleeping. Fabrics sold by the yard which are intended for children's sleepwear must also meet the test.
3. Each of 5 samples is hung in a cabinet and exposed to a gas flame along its bottom edge for 3 seconds.
4. The samples cannot have an average char length of more than 7 inches.
5. No single sample can have a char length of 10 inches.
6. No single sample can have flaming material in the bottom of cabinet 10 seconds after ignition source is removed.
7. This testing is required after samples are laundered 50 times.
8. Manufacturer is not required to label the garment.
9. Care labels must be attached if any agents or treatments could adversely affect the flame retardant qualities of the fabric.

Factors To Consider In Purchasing Garments
That Are Not Flame Resistant

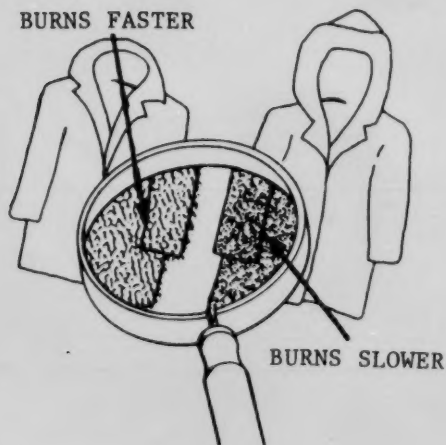
Construction of Material. The flammability of garments varies considerably depending upon the construction of the fabric.



FABRIC WEAVE AND WEIGHT. The tightly woven heavy fabrics will ignite less easily and burn more slowly than sheer, lightweight and loosely woven fabrics (assuming that the fiber, surface finish and pile height are the same). For example, fabric such as broadcloth (in shirts) is lightweight and burns rapidly. On the other hand, such fabric as denim (in jeans) is more tightly woven, heavier weight, and will not burn as rapidly.

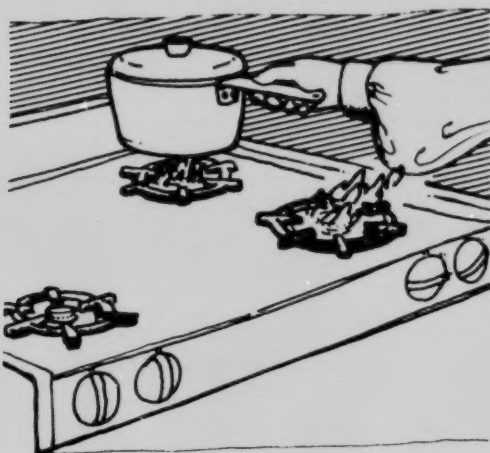


SURFACE FINISH. Napped fabric (such as flannel) with air spaces between the loose fibers, will ignite much faster than a smooth surfaced material (such as denim).

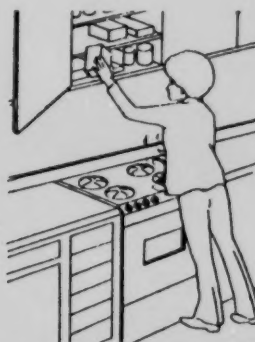


PILED FABRIC. A fluffy high pile will burn faster than a close knit, low pile (the fiber, weave, weight and surface being equal).

Design. Tailored or close-fitting garments are less likely to be ignited than loose-fitting garments.



CLOTHING WITH BELL-TYPE SLEEVES, RUFFLES, AND TRIMS (such as robes or housecoats). These are most likely to catch fire when worn near the lighted burner of a stove or other sources of ignition.



LOOSE-FITTING BLOUSES (ESPECIALLY MATERNITY BLOUSES) AND MEN'S SHIRT-TAILS. These can catch fire when one reaches across a lit burner or reaches for an object over the stove.



LONG GOWNS, ESPECIALLY NIGHTGOWNS, can catch fire when worn around fireplaces, space heaters, and stoves.

Home Furnishings.

UPHOLSTERY ITEMS. Upholstered furniture is a flammability hazard. Like mattresses, the most typical source of ignition appears to be cigarettes. The U.S. Consumer Product Safety Commission is developing regulations to govern the flammability (smolder resistance) of upholstered furniture. Smokers should be especially careful not to drop cigarettes or matches on upholstery, since they can smolder and later ignite a couch or chair.



DRAPERY ITEMS. Never place draperies and curtains near a stove, radiator or other sources of fire.

Precautions to Avoid a Flammable Fabric Accident

Look for, ask for, and, as it becomes more available, purchase flame resistant sleepwear and other garments for all the family, particularly for the elderly and the handicapped. Flame resistant ironing board pads and drapes also are being sold. Ask for these and other flame resistant fabrics and products at your retail stores.

Be aware that certain activities are more likely to result in a burn accident:



USING THE STOVE--that YOUNG CHILDREN OFTEN CLIMB ON TOP OF STOVES and may ignite their clothing from a lit or still hot burner.

--that people TRY TO KEEP WARM BY LEANING AGAINST STOVES, and their clothing may ignite.

--that PEOPLE WEARING LOOSE-FITTING SLEEVES OFTEN REACH ACROSS LIT BURNERS either to operate control knobs or to reach for pans, and their sleeves ignite.

--that in reaching across the stove to REMOVE A PAN FROM A LIT BURNER a person sometimes USES A TOWEL INSTEAD OF A POT-HOLDER. This may cause a dangling towel to catch fire and ignite the person's clothing.





SMOKING--Be aware that many people FALL ASLEEP WHILE SMOKING. This may cause upholstered furniture or a mattress to catch fire.



USING MATCHES OR LIGHTERS--Be aware that the elderly and the handicapped often DROP MATCHES on themselves when lighting cigarettes, cigars or pipes, resulting in ignition of their clothing, bedding, etc. The otherwise simple task of lighting a match becomes complicated when physical handicaps exist.



--that many people, especially the elderly and the handicapped, SPILL LIGHTER FLUID when refilling a lighter. The lighter fluid may ignite, resulting in a fire.



PLAYING WITH MATCHES OR LIGHTERS--
Be aware that YOUNG CHILDREN often ignite their clothing while playing with matches or lighters. Children often find matches where their parents have left them!



USING FLAMMABLE LIQUIDS--Be aware that flammable liquids (such as gasoline, acetone and contact adhesives) must N E V E R be used near matches, cigarettes or pilot lights (water heaters and stoves) because of the dangers of the vapors from flammable liquids. IT IS THE VAPORS THAT IGNITE.

1. Vapors can escape from an open container of a flammable liquid even in very cold temperatures.
2. Vapors can travel to an ignition source, even in another room.
3. An ignition source, such as the pilot light of a water heater, a match, or a cigarette, can cause the VAPORS of the flammable liquid TO IGNITE and in turn ignite clothing or other items.
4. Storing flammable liquids near ignition sources (such as pilot lights) is very dangerous. Store flammable liquids in safety containers.

How to Treat a Burn Injury



Cool the burn by immersing the extremity or holding it under running, cool water. The cool water reduces pain and halts thermal destruction of the skin.

Call a doctor promptly--even small burns can become serious if they are not properly treated.

Cover a large burn with a clean, dry sheet or other freshly ironed linen.

Do not try to clean the burn.

Do NOT put grease, butter, or ointments on a burn.

Do not pull clothing over the burn.

Do not try to remove pieces of cloth that stick to the burned area.

Do not break blisters.

If your clothing catches fire, remove it as quickly as you can. If this can't be done. . .

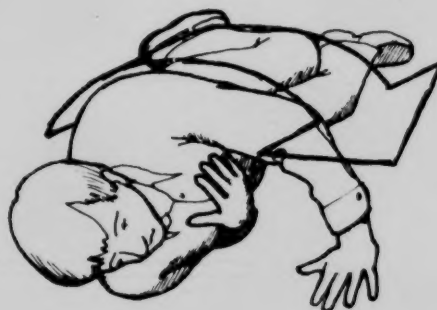
DROP down immediately.

ROLL in a blanket or rug to extinguish the flames.

REMOVE smoldering clothing, if not adhering to the skin, and put cold water on the burns.

WRAP in a clean sheet.

CALL a doctor immediately.



DON'T MIX FABRIC AND FLAME



Keep children from climbing on top of or around ranges by removing all "bait" from the area.

Don't warm yourself by leaning against or turning your back to a range.



Avoid wearing loose fitting clothing while cooking or working near the hot burners of a range.



Use potholders instead of kitchen towels that hang down loosely.



Avoid smoking in bed.

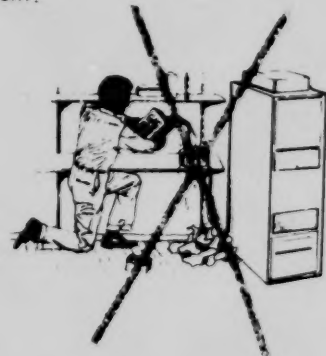


Upholstered furniture is flammable, so keep smoking materials away.



Keep matches and lighters away from children.

Flammable liquids should not be used in a confined area or near an ignition source.



Clothing: Sewing Safety Rules

1. Good posture at all times will reduce hazards by assuring better balance, better health, and less fatigue.
 - a. Body straight and relaxed.
 - b. Back against chair back.
 - c. Chair adjusted to the proper height.
 - d. Both feet positioned on treadle.
2. Keep hands a safe distance from needle at all times.
3. Do not put feet on treadle while setting or threading the needle.
4. Keep scissors and other sharp objects away from belt at all times.
5. Do not remove or replace belt while motor is running.
6. If thread should get caught in the belt do not attempt to break it with hand. Turn off motor immediately.
7. Turn off the motor before getting under the machine to do any necessary task.
8. Do not pull on electric wire to disconnect plugs. Grip plug firmly in hand and gently pull from outlet.
9. Be sure cord is not rubbing against belt or other abrasive surface.
10. Know location of switches, plug-ins, fuses, and breakers in case of emergency.
11. Turn off motor in case of emergency, or when there is any question or doubt in your mind about the proper function of the machine.
12. Notify instructor or supervisor of any broken parts.
13. Keep aisles clear at all times.
14. Keep floors free of oil or any substance or fluid that might cause someone to slip and fall.
15. Keep machine and work station clean, neat, and orderly at all times.
16. Replace bent needles, light bulbs, and other broken equipment immediately or report to supervisor or instructor.
17. Report any accident, regardless of how minor, immediately.
18. Avoid wearing clothing that might become entangled in machinery.

19. Restrain long hair that might become entangled in machinery.
20. Jewelry is out-of-place near any machinery.
21. Do not put pins or needles in the mouth or on the machine. Use a pin cushion.
22. Keep scissors closed while not in use.
23. Keep your eyes on your hands and your mind on your work.
24. Do not visit with neighbors while working.
25. Make sure knee lift and treadle are properly adjusted to illuminate soreness in knees and feet.
26. Do not attempt to operate any machine until you have received proper instruction.
27. Make sure guards are in place and are functioning properly.
28. Never lean or lounge on any machine.
29. Never operate a machine when in poor health. All the senses are needed to be a safe operator.
30. Do not attempt to sew on industrial machines without taking corrective measure for poor eyesight.

CLOTHING SAFETY QUIZ

1. Denim is _____ to ignite than cheesecloth.
 - A. More likely
 - B. Less likely
 - C. No more or less likely
 2. Terrycloth is _____ because it is _____.
 - A. Safer than most fabrics/heavy
 - B. Less safe than some fabrics/filled with air spaces between the yarns
 - C. Safe/made of natural fiber
 - D. Not safe/often used in the kitchen
 3. Flame-resistant fabrics are good choices for draperies _____.
 - A. Because these fabrics ignite quickly
 - B. Because drapery fabrics are not important
 - C. Because these fabrics do not ignite easily
 - D. Because these fabrics can be hung while damp
 4. When buying furniture, it is _____ to consider the flammability of the upholstery fabric and stuffing.
 - A. Not necessary
 - B. Always important
 - C. Sometimes important
 - D. Ridiculous
 5. What type of clothing is less likely to ignite?
 - A. Loose-fitting clothing with wide long sleeves and pants legs
 - B. Lightweight clothing which blows easily
 - C. Close-fitting clothing made of lightweight fabric
 - D. Close-fitting tailored clothing made of heavyweight fabric
 - E. Flame-resistant fabrics
 6. What should you do if your clothes catch fire?
 - A. Drop to the ground and roll
 - B. Run for water and douse yourself
 - C. Call your local fire station
 - D. Pray
 7. What precautions should be taken while cooking to prevent clothes catching fire?
 - A. Keep a bucket of water handy by the stove
 - B. Tape the number of the local fire station on the refrigerator
 - C. Wear loose fitting clothes with long wide sleeves while using the stovetop or oven
 - D. Wear close-fitting clothes made of smooth and tightly woven fabric when using the stovetop or oven
 8. The U.S. Consumer Product Safety Commission is responsible for administering and enforcing flammability standards for _____.
 - A. Dish towels, bath towels, and wash cloths
 - B. Handmade quilts, afghans, and tablecloths
 - C. Clothing, carpets, rugs, mattresses, and children's sleepwear
 - D. Books, magazines, and newspapers
- TRUE or FALSE
- ___ 9. Good posture at the sewing machine will reduce hazards.
- ___ 10. Report all accidents regardless of severity immediately.

Clothing Safety Quiz continued

TRUE or FALSE

- ___ 11. Visiting with your neighbor while sewing is acceptable as it improves human relations among workers.
- ___ 12. Once you have learned to operate a basic sewing machine you can go ahead and operate other machines without bothering the instructor or supervisor.
- ___ 13. Always keep machine and work station clean, neat, and orderly.
- ___ 14. Keep your ___ on your hands and your ___ on your work.
- ___ 15. Know the location of switches, plug-ins, fuses, and breakers in case of _____.
16. List 5 activities that are likely to result in a burn accident.
- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
17. The involvement of clothing usually increases the _____ of body burns.

CLOTHING SAFETY QUIZ ANSWERS

1. B
2. B
3. C
4. B
5. D & E
6. A
7. D
8. C
9. TRUE
10. TRUE
11. FALSE - it causes lack of concentration and accidents.
12. FALSE - always receive instruction before operating new machinery.
13. TRUE
14. Eyes, mind
15. Emergency
16. Using the stove
Smoking
Using matches and lighters
Playing with matches and lighters
Using flammable liquids
17. Severity

FOODS

Safety is no Accident

You would not want to do anything in the kitchen to cause either yourself or someone else to have an accident. Remember that accidents are caused, they do not just happen.

The Main Causes of Accidents

1. Rushing
2. Fatigue
3. Unsafe conditions
4. Unsafe actions
5. Not thinking
6. Not being observant

These main causes of accidents may be avoided in these ways:

TO AVOID RUSHING

- . allow enough time by starting early
- . leave out non-essentials if time is short
- . use good time and motion practices
- . do not leave too much to do at the last minute
- . relax

TO AVOID FATIGUE

- . first be able to recognize it and know what it can lead to
- . use work methods that save time and energy
- . do not take on more than you can handle when you are over-tired
- . take a rest break

TO AVOID UNSAFE CONDITIONS

- . stools, chairs, etc., left in passageways or aisles
- . cabinet doors left open
- . spilled foods
- . frequently used or heavy items stored in hard to reach areas

Foods: Safety is no Accident continued

TO AVOID UNSAFE CONDITIONS

- . faulty utensils or appliances
- . crowded work areas
- . children underfoot

TO AVOID UNSAFE ACTIONS

- . Do not stand on chairs or boxes to reach high places
- . Dress properly
- . Use right utensil for the job
- . Cut away from yourself and others
- . Lift pot covers away from yourself and others
- . Do not stir in deep containers with short utensils
- . Wrap broken glass and throw away properly
- . Do not cook foamy foods or large quantities of food in small pans.
- . Slide oven rack out when testing or removing food from oven
- . Do not place fine glassware or sharp items into dishwasher

TO AVOID NOT THINKING OR NOT BEING OBSERVANT

- . Do not try to do too many things at one time
- . Not knowing what to do in case of emergencies
- . Not keeping fire extinguishers at hand
- . Rushing needlessly
- . Not picking up and wiping up as you work
- . Do not operate equipment before studying directions
- . Do not leave appliances turned on or plugged in when not in use

Foods: Common Food Service Accidents and Causes

I. SLIPS AND FALLS

- . spilled food and grease
- . tripping over something
- . over-reaching

II. CUTS

- . being struck by objects
- . bumping against furniture or equipment
- . caught in or between doors or equipment
- . broken glass or china
- . operating cutting equipment incorrectly

III. BURNS

- . faulty electrical equipment
- . scalding liquids and foods
- . hot ranges, fryers, cooking units

IV. STRAINS FROM LIFTING

- . overloading trays
- . lifting too heavy items
- . carrying loads incorrectly

In a commercial kitchen-safety is everyone's job, and is a responsibility that never ends.

FOOD SERVICE
SAFETY GUIDELINES

Foods

To prevent slips and falls:

1. Wear safe work shoes with sensible heels.
2. Use a safe ladder and avoid over-reaching.
3. Avoid storing items on top of high places.
4. Store heavy, bulky items on lower shelves.
5. Keep floors clean.
6. Report any hazards immediately.
7. Use precaution when going through doorways and around corners.
8. Do not leave debris in aisles or passageways.
9. Clean up spills immediately.
10. Walk-Don't Run.

To prevent cuts:

1. Never open cans with a knife.
2. Avoid wearing loose fitting clothing when using cutting, chopping, and mixing equipment.
3. Make sure cutting utensils are sharp.
4. Pay attention to your job, especially when using sharp utensils.
5. Pick up knives and other sharp utensils by their handles.
6. Use a cutting board.
7. Cut away from yourself and from others.
8. Do not try to catch a falling knife.
9. Wash knives immediately after using and store them properly.
10. Do not leave knives laying around or in the sink in dishwater.
11. Use the proper safety guards for cutting and slicing machines.
12. Sweep up broken glass and china immediately.
13. Discard chipped or cracked glass and china.
14. Put broken glass in separate, labeled trash containers.

Food Service Safety Guidelines continued

To prevent burns:

1. Use pot holders when handling hot items.
2. Remove pan covers by lifting the lid away from you.
3. Keep stoves, ovens, and hoods free from grease.
4. Get help to handle heavy, hot containers.
5. Avoid over-filling pots with hot liquids or foods.
6. Turn handles of pans away from edge of stove and other burners.
7. Make sure hands are dry before plugging in electric cords.
8. Report faulty electrical equipment promptly.

To avoid strain:

1. Do not overload trays.
2. Place dishes and foods on trays carefully so the weight is balanced.
3. Carry trays and heavy items correctly.
4. Lift heavy objects correctly.
5. Get help to lift and carry extremely heavy objects.

Safety Inspections

Please refer to Section XV, "School Facilities" for the recommended checklist used for safety inspections of food service laboratories.

Foods: The Selection of Food Service Equipment

When selecting equipment care should be taken to select the piece of equipment that is least likely to be dangerous to operate. If this is not possible, then safeguards should be built into it to make it less hazardous.

Questions to Ask When Selecting Food Service Equipment.

1. Does equipment meet required codes?
2. Are sharp edges and moving parts guarded?
3. If customers will be around this equipment, can safeguards be established to lessen hazards?
4. Are finishes of the nature to give good cleanability and serviceability?
5. Is it easy to operate?
6. Are areas that might harbor insects or dirt sealed off or made easily cleanable?
7. Are corners and edges rounded to make cleaning easy?
8. Is trim eliminated to make cleaning easier?
9. Are doors removable?
10. Are all gaskets cleanable and removable?
11. Can drawers and bins be removed and cleaned?
12. Do drawers and bins have limit stops?
13. Is equipment strong and sturdy enough for intended use?
14. Are bolts, screws, etc., countersunk and welded into metal?

Foods: The Kitchen

The kitchen is the most hazardous area of a restaurant or institutional food area. Most accidents that occur are a result of improper or careless use of equipment, utensils, or slippery floors.

Hazardous equipment that is used in the food preparation area must meet certain guidelines. It should be given adequate space for safe use, and regularly checked for needed repairs.

Particularly hazardous equipment includes those that are used for cutting, grinding and mixing.

1. Adequate space must be provided to operate slicers without being bumped.
2. Slicing and cutting equipment should be placed away from the flow of traffic.
3. Knives and other sharp utensils should have proper use stations and storage areas.

Cooking and preparation equipment should be arranged to prevent possible fires.

1. Grills, ranges and deep fat fryers should be placed under hooded areas with exhausts to the outside.
2. Hoods should have a fire extinguishing system built into them and be easy to operate.
3. Pressure cooking equipment can cause steam burns and should be located in noncongested areas.

Other hazardous equipment used in kitchens might include dish-machine, waste disposal and incinerators.

General Repair Guidelines that Keep Food Preparation Equipment Operating Safely.

1. Slicer must be sharp.
2. Mixer should be firmly bolted to the floor or counter.
3. Knives must be sharp to cut easily.
4. Steamers must be free of steam leakage.

General Repair Guidelines continued

5. Microwave oven should be operating correctly to prevent radiation leakabe.
6. Grills and ranges operating properly to prevent fires and explosions.
7. Fryers should not leak grease or overheat.
8. Dishmachines kept in proper working order by trained repairman.
9. Tables, chairs, ladders and other equipment should be sturdy and secure.

See OSHA standards, in this section, for list of guidelines that must be met in food preparation area. Also see Major Appliance Section for specific use and care of food service equipment.

Foods: The Dining Room

The design of the dining room should consider safety first then beauty. The following safety features should be followed for each specific area.

THE FLOOR

1. The fewer the stairs and different levels, the safer the floor space, especially for young and elderly.
2. If there are steps, are they of proper height and depth? (See additional information in this section.)
3. Are there ramps available for handicapped persons?
4. Are there railings to hold on to?
5. Are floors even?

ROOM LAYOUTS

1. Are areas easy to reach without bumping into other customers or furniture?
2. Depending on the type of service, are traffic patterns unobstructed?
3. In case of emergency, is an exit easily reached?

CEILINGS

1. Is it flammable?
2. In older buildings, are ceilings sturdy?
3. In cases of false ceilings, are they flame retardant?

WALLS

1. Are they structurally sound and flame retardant?
2. Are coverings flame retardant?
3. Are there an adequate number of large beams to hold up roof?

LIGHTING

1. Is it adequate for seeing hazards to prevent slips and falls?
2. Have bulbs been replaced as needed?

Foods: The Dining Room continued

EXITS

1. Are they easily accessible for customers as well as workers?
2. Are they in various locations?
3. Are they clearly marked?

FURNITURE

1. Is it easily kept clean?
2. Are they fire retardant?
3. Do chair legs protrude into aisles?
4. Is it sturdy, especially if it is an antique?

FLOOR COVERINGS

1. Is walking surface even?
2. Is carpeting in good condition?
3. Is floor slippery?
4. Can customers see changes when going from one type floor covering to another?

WALL COVERINGS AND DRAPERIES

1. Are they fire retardant?

Foods: OSHA Health and Safety Guidelines

The equipment in kitchens is designed to either heat, cut, mix, or grind food and the increased activity and pressure during peak serving time heightens the chance of an injury or accident unless proper care is exercised. In kitchens the following items should be noted:

1. The floor must not be slippery.
2. Broken slats in wooden mats must be repaired or replaced.
3. Spilled food and broken dishes should be cleaned up immediately.
4. All electrical equipment must be grounded.
5. All exposed drive belts and chain and sprocket drives must be guarded.
6. Exhaust hoods and ducts must be cleaned regularly.
7. Carts, boxes, trash cans, and other items must never block exits, passageways, fire extinguishers, or electrical breaker panels.
8. Portable fire extinguishing equipment must be of the proper type, properly located, and kept in working order.
9. Where automatic fire control systems are used, the head of the nozzle must be directed toward the potential fire area.
10. It is suggested that steam, gas, and water pipes be identified as such. All steam pipes located within 7 feet of the floor or working platform which the employee may contact must be properly insulated, covered, or guarded.
11. Carbon dioxide bottles (tanks) should be stored and secured where they cannot be knocked over. All gauges on the tank should be in good working order.
12. Trash compactors should not be operable with lids open.



Foods: OSHA Health and Safety Guidelines continued

13. All fans less than 7 feet from the floor must be guarded with openings no larger than 1/2 inch.

14. Microwave ovens should be cleaned often and checked periodically with a special instrument to ensure that there is no microwave radiation leakage.



15. Metal treadle guards should be placed over foot controls on steam cleaning machines for garbage cans or other items to prevent accidental operation of pedals.
16. All steam equipment should be operated within the manufacturer's recommended limits. Steam kettles should be drained of water before steam valves are opened.
17. Automatic coffee makers of the filter-type with rotating hot water pipes can cause severe burns if accidentally turned on while over an employee's hand. Employees should be alerted to this hazard.
18. Hot water relief valves should be inspected regularly.

19. Heavy lids on equipment such as steam kettles should have a means of securing them to prevent accidental falling.
20. Machines used for slicing, cutting, grinding, etc., should have guards placed on all toggle switches to prevent accidental starting.
21. Walk-in freezers should have an inside light switch and a way of opening the door from the inside.



Foods: OSHA Health and Safety Guidelines continued

22. Knives and cutting tools should be kept sharp.
23. Knives and cutting tools should be stored with blades protected and placed so they do not protrude into walkways.
24. Proper precautions should be taken when handling hot items.
25. Several glasses should not be picked up in one hand by placing fingers into the glasses and bringing them together.
26. Employees should not wear clothing that can easily be caught or burned.
27. Employees should not engage in horseplay.
28. It is suggested that counters or tables in the kitchen have rounded or protected edges.

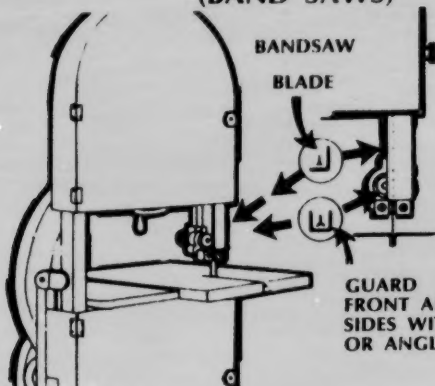
Foods: OSHA Machine Guarding

It is generally recognized that machine guarding is of the utmost importance in protecting the employee. Personnel cannot always be relied upon to act safely around machinery in motion to avoid accidents.

In the food industry, machinery having cutting, grinding, shearing, rolling, punching, pressing, mixing, or similar actions is common and represents potential safety hazards unless properly guarded. The following equipment must be guarded at the point of operation.

1. Meat saws (band saws)
2. Meat and vegetable choppers ("buffalo choppers")
3. Meat and vegetable slicers
4. Meat, fish, and other food grinders
5. Garbage disposals

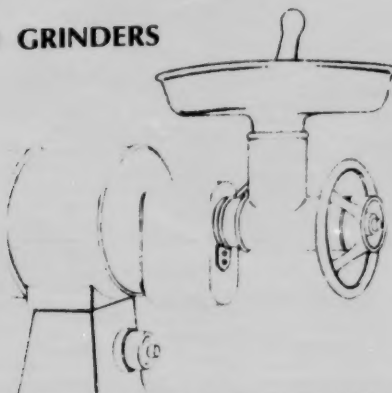
GUARDING CUTTING ACTIONS ON MEAT SAWS (BAND SAWS)



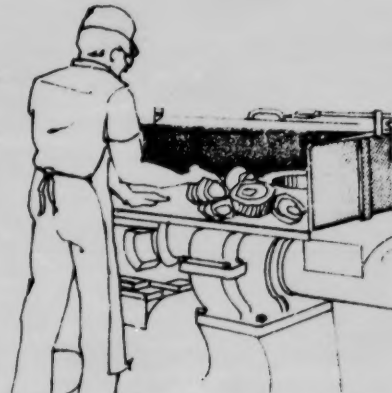
BAND OR BAND RESAW WHEELS MUST BE COMPLETELY ENCLOSED AND ALL PORTIONS OF THE BLADE SHOULD BE GUARDED, EXCEPT THAT PORTION BETWEEN THE GUIDE ROLLS AND THE TABLE

GUARDING CUTTING ACTIONS BY POSITION

FOOD GRINDERS

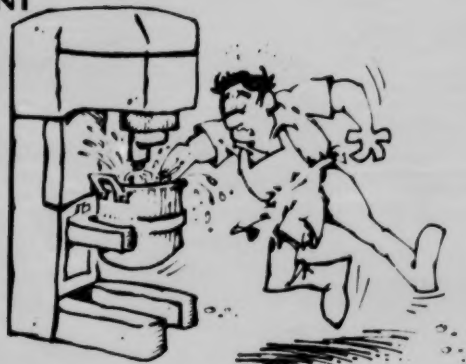


HOPPER OF SUCH SIZE AND NECK SO SMALL THAT OPERATOR'S FINGERS CANNOT COME IN CONTACT WITH THE WORM.



DISTANCE FROM FRONT OF HOPPER TO OPENING OVER WORM IS SUCH THAT OPERATOR CANNOT REACH INTO THE WORM.

BAKERY EQUIPMENT



Many restaurants have some bakery equipment on the premises. These specific requirements apply to bakery equipment.

1. Any machinery using electric current must have the frame and electrical components grounded.
2. All gears, sprockets, and belt drives within reach from floors and platforms, or less than $8\frac{1}{2}$ feet from the floor must be enclosed.
3. All rotating parts must be smooth. For example, lubrication fittings or any other member which is not flush with the rotating part must be recessed or guarded.
4. Manually fed dough brakes must be equipped with protection for the top roll. An emergency stop bar must be provided and located so that the body will press against it if the operator slips and falls toward the rolls, or if the operator gets a hand caught in the rolls. The operation of the emergency stop bar must be tested at least every 30 days.
5. All slicers must be provided with a mechanical device to push the last loaf of bread through the slicer knives.
6. Doughnut machines must have separate venting flues for vapors from the frying section and the heating chamber for the fat. A type "B" fire extinguisher must be readily available in the area of the doughnut fryer.
7. Horizontal mixers with either power or manual dumping arrangements must be equipped with safety devices which engage both hands of the operator while the agitator is in motion under power, when the bowl is open more than one-fifth of its total opening. Both hands of the operator must be engaged to start the agitator when the bowl is more than one-fifth open.

Foods: OSHA Machine Guarding continued

8. Devices must be available for moving bowls weighing 80 lbs. or more with contents, into and out of the mixing position of vertical mixers.
9. All dumpbins must be of a suitable height from the floor to enable the operator to dump flour from bags without undue strain or fatigue. Where the edge of any bin is more than 24 inches above the floor, a bag rest must be provided. Openings in chutes must be protected by means of bars or grids. If the grids are made of mesh, the openings must not be larger than 3 inches in length or width. A control device for stopping the dumpbin and blender must be close to the normal location of the operator.

OCCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROLS

Persons working in eating and drinking establishments can be exposed to several potential occupational health problems. The most common are:

1. AMMONIA solution is frequently used as a cleaning agent. The employees should avoid skin contact by wearing protective clothing such as rubber gloves. If skin or eye contact occurs, the affected area must be washed promptly. Ammonia gas is released from the solution and therefore, good ventilation must be provided. For example, the hood should be operating when employees are cleaning grease from the range.
2. DRAIN CLEANERS cause skin burns and damage to the eyes. If there is the possibility of splashing, rubber gloves and goggles and/or a face shield must also be worn by employees using drain cleaners.
3. STRONG CAUSTIC SOLUTIONS are often used for cleaning reusable filters for range, grill, and broiler exhaust hoods. Protective clothing and equipment may be required to avoid skin or eye contact.
4. SOAPS AND DETERGENTS may cause contact dermatitis (skin rashes) or throat irritation may occur from inhalation of soap dust. Disposable respirators (face masks) may be needed by employees who are sensitive to the dust.



5. CARBON MONOXIDE may be present where ovens and charcoal broilers are not properly ventilated. If the restaurant has an enclosed parking facility, the attendants may be exposed to harmful levels of carbon monoxide present in automobile exhaust.

6. MICROWAVE OVENS are becoming a standard appliance in many restaurants. As ovens get old, hinges and catches may loosen, and microwaves may leak. The units should be cleaned regularly, since spilled food can prevent oven doors from closing properly. If the interlock system fails, the unit may not shut off when the door is opened. Units should be checked periodically for leaks by properly equipped and trained persons.
7. ULTRAVIOLET RADIATION can be harmful to the skin and eyes. Examples of low-intensity ultraviolet radiation sources are low-pressure mercury vapor lamps and black-light lamps.
8. HEAT STRESS may be a problem in kitchen areas. High heat levels can cause heat-related illnesses and employees should be made aware of the symptoms of heat disorders and the need for water and salt replacement.
9. NOISE exposure that exceeds the allowable limits can occur in cabarets, bars, lounges, etc. where live entertainment is featured. Noise exposure can be reduced by reducing sound amplifier volume and/or instituting administrative controls to limit the time of exposure.

SAFETY CHECK LIST

COOKING FACILITIES

- Yes ___ No ___ 1. Are the filters removed from the exhaust fans and cleaned at least once each week?
- Yes ___ No ___ 2. Are the handles of all pots and pans turned away from the edge of the stove?
- Yes ___ No ___ 3. Are ovens, ranges, broiler drip pans and deep fat fryers kept clean and free from excess grease to prevent fires?
- Yes ___ No ___ 4. Are the gas pilots burning before turning on the valves of gas stoves?
- Yes ___ No ___ 5. Are all doors, such as steamers and ovens, kept closed?
- Yes ___ No ___ 6. Are mitts or pot holders always used when handling hot pans and equipment?
- Yes ___ No ___ 7. Do employees keep hands and fingers out of choppers, grinders, and mixers?

CUTTING TOOLS

- Yes ___ No ___ 1. Do employees use knives only for cutting and not to open jars, cans, or other containers?
- Yes ___ No ___ 2. Do employees point the blade of the knife away from any part of the body?
- Yes ___ No ___ 3. Do employees avoid putting knives in a sink? Do they properly wash and dry knives?
- Yes ___ No ___ 4. Is there a sanitary knife holder or rack available for proper storage of knives when not in use? Do employees avoid storing knives loosely in drawers?
- Yes ___ No ___ 5. Do employees use the proper knife for each cutting operation (peeling, slicing, chopping, etc.) and shown the proper procedure? Do employees use cutting boards?
- Yes ___ No ___ 6. Do employees avoid putting paring knives, or any other sharp pointed instrument, in their pocket?

SAFETY CHECK LIST

ELECTRICAL EQUIPMENT

- Yes ___ No ___ 1. Are electrical outlets of the grounded type? Does the electrical equipment have 3-prong plugs?
- Yes ___ No ___ 2. Do employees know how to operate each piece of electrical equipment?
- Yes ___ No ___ 3. Do employees know how to cut off the steam before opening the steamer door?
- Yes ___ No ___ 4. Do employees remove covers of containers so the steam will go away from them?
- Yes ___ No ___ 5. Do employees turn off electrical equipment and disconnect the plug before cleaning?
- Yes ___ No ___ 6. Do employees use safety guards on electrical equipment, check to see that they are in working order and report defective equipment promptly?
- Yes ___ No ___ 7. Do employees check for broken electric plugs and frayed electric wires and report them promptly?
- Yes ___ No ___ 8. Do employees safely dismantle equipment for thorough cleaning?
- Yes ___ No ___ 9. Do employees avoid handling electrical equipment with wet hands?
- Yes ___ No ___ 10. Do employees keep hands out of garbage disposals when they are on?

CHINA, GLASSWARE

Do employees:

- Yes ___ No ___ 1. Brush broken china and glassware on a dust pan and not pick it up with bare hands?
- Yes ___ No ___ 2. Discard all chipped and cracked china and glassware?
- Yes ___ No ___ 3. Place all broken china and glassware in a container designated for this and labeled not to be handled?
- Yes ___ No ___ 4. Handle china and glassware by safe and correct methods?

SAFETY CHECK LIST

CHINA, GLASSWARE

5. Do employees notify the supervisor whenever glass or dishes are broken in the vicinity of food so that the food will not be served?

GENERAL

- Yes___ No___ 1. Do employees report any light that will not burn?
- Yes___ No___ 2. Are safe step ladders or stands for reaching high places provided? Do employees use these?
- Yes___ No___ 3. Do employees use dollies and trucks to move heavy items, such as cases of goods or garbage cans?
- Yes___ No___ 4. Do employees use small carts to transport dishes, pans of food, etc.--and not carry a stack of dishes with their hands?
- Yes___ No___ 5. Do employees wipe up spilled food, water, or grease at once?
- Yes___ No___ 6. Does each employee know how to use a fire extinguisher and know where they are located?
- Yes___ No___ 7. Do employees know their responsibilities and what to do when fire drills are held or in case of a real fire?
- Yes___ No___ 8. Do employees know where emergency exits are and do they know they must be kept clear at all times?
- Yes___ No___ 9. Do employees report every accident or injury, no matter how slight, immediately to their supervisor?
- Yes___ No___ 10. Do employees pick up any foreign object seen on the floor such as paper clips?
- Yes___ No___ 11. Are insecticides or cleaning agents stored away from food supplies?
- Yes___ No___ 12. Do employees wear well-kept, comfortable shoes with low rubber heels to protect their feet against injury from articles that may be dropped on their feet?

FOODS SAFETY QUIZ

1. List 4 causes of accidents:

- a. _____
- b. _____
- c. _____
- d. _____

2. List the 4 most common food service accidents:

- a. _____
- b. _____
- c. _____
- d. _____

3. Hazardous equipment should be dealt with in what 2 ways?

- a. _____
- b. _____

4. List 5 pieces of hazardous equipment you might find in a restaurant kitchen:

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

11. List the equipment that must be guarded at the point of operation.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____

12. In a commercial kitchen _____
is everyone's job and is a
responsibility that _____
ends.

13. The _____
is the most hazardous area of
a restaurant or institutional
food area.

14. The design of the dining room
should consider _____
first then beauty.

15. Floorcoverings, wallcoverings,
draperies, etc., should all
be _____.

TRUE or FALSE

___ 5. Machine guarding is of the utmost importance in protecting the employee, and should not be removed.

___ 6. Always try to catch a falling knife so it won't cut your foot or damage the floor.

___ 7. Clean up spills immediately.

___ 8. Heavy, bulky items should be stored on the top shelves.

___ 9. Always use a cutting board.

___ 10. Overloading trays that you lift can cause strain.

FOODS SAFETY QUIZ ANSWERS

1. Rushing
Fatigue
Unsafe conditions
Unsafe actions
Not thinking
Not being observant
2. Slips and falls
Burns
Cuts
Strains from lifting
3. Adequate space for safe use
Regularly checked for repair
as needed
4. Slicing, cutting, grinding
equipment
Knives
Grills, ranges, fryers
Pressure cooking utensils
Dishmachines
Waste disposals
Incinerators
Bakery equipment
Microwave oven
5. TRUE
6. FALSE - may cut your hand
7. TRUE
8. FALSE - too big a chance.
They can cause strains when
taken down, or may fall.
9. TRUE
10. TRUE
11. Meat saws (band saws)
Meat and vegetable choppers
(buffalo choppers)
Meat and vegetable slicers
Meat, fish and other grinders
Garbage disposals
12. Safety, never
13. Kitchen
14. Safety
15. Fire retardant

HOUSING/HOME FURNISHINGS

Misuse of Consumer Products

Probably the most common feature to many of these accidents is the neglect to read and follow instructions and warning labels.

1. IMPROPER MIXING - some products are hazardous if mixed together. They release hazardous gases which can kill you or the resulting solution can be caustic and burn your skin.
2. OVERUSE - some people think that if a small amount is good, then a large amount must be better.
3. HASTE - tempting to race through preliminary steps in order to use a product and get a job done.
4. LACK OF MAINTENANCE - failure to repair broken products and lack of maintenance.
5. IMPROPER STORAGE - can lead to explosions and poisonings.

Here are some specific questions to consider regarding consumer products.

- . Is the product appropriate for the intended use and user?
- . Are there some safer types of the same product which are preferable?
- . Do you read the label and follow the directions?
- . Are there any possible hazards which you should be aware of?
- . Are there some steps you can take to make the product safer?
- . Should you restrict children from the area where you are using the product?
- . Are you tired or in a hurry?
- . Are there any broken, loose, worn, or dirty parts which should be repaired or replaced?
- . Is the product near a flame or heat source, or within the reach of children?
- . Is it in a sturdy, nonbreakable container that is clearly labeled?
- . Is it stored in a dry place to prevent deterioration caused by dampness?

Can the product be burned, or should it be put with non-burnable trash?

Housing: Bathtub and Shower Injuries

The four most serious types of bathtub and shower accidents are falls, burns, electrocutions, and drownings.

FALLS - cause the majority of these bathtub/shower accidents.

1. Use a suction-cup rubber mat or rough-surfaced adhesive strips.
2. There should be at least two grab bars securely mounted on the wall beside bathtub at different heights.
3. Similar accessories should also be mounted securely. A falling person will grab at first available support.
4. Be sure tub and shower accessories are free of sharp edges.

BURNS - cause accidents among young, elderly, and handicapped because they are less able to respond quickly and effectively to an emergency.

1. Never leave a baby or small child in a bathtub for any reason at all.
2. Always test bath water of an infant or baby.
3. Bathtub and shower should have a faucet that mixes hot and cold water.

ELECTROCUTIONS - usually when water and electricity is mixed.

1. Many electrical accidents would be prevented if electrical appliances were kept out of the bathroom.
2. Never touch any electrical fixture or appliance with wet hands or while standing on a damp floor.
3. If building a home, provide only one outlet in the bathroom as far from the tub as practical.

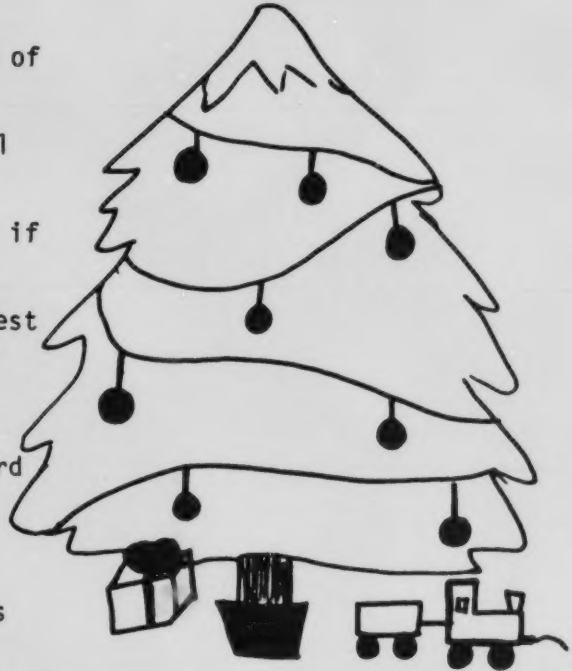
DROWNINGS -

1. Never leave a small child unattended in the bath.

2. Close watch should also be kept over elderly and handicapped, or any family member's overly long stay in the bathtub.

Housing: Christmas Safety Tips

1. Choose a small tree instead of a large one.
2. Keep the tree outdoors until you are ready to put it up.
3. The tree will look freshest if put up close to Christmas.
4. Set the tree up in the coolest part of the room, away from radiators, heaters, and fireplaces.
5. Stand tree in water to retard drying.
6. Use fireproof decorations.
7. Don't set up electric trains around or near the tree.
8. Use electric lights - NEVER candles. Inspect every socket and wire to make sure they are in good condition.
9. Provide a switch at some distance from the tree for turning lights off and on.
10. Discard gift wrappings safely and promptly after presents are opened.
11. Don't leave lights burning when you're away from home or during the night.
12. Inspect lights and the needles near the lights. If needles have started to turn brown, move the lights.
13. When needles start to fall, take down the tree.



Housing: Extension Cords and Wall Outlets

The major accident patterns associated with extension cords are:

1. Children put extension cord receptacle or appliance cord plug into their mouths.
2. A worn or faulty connection can result in electrocution, electrical burns, shock or short circuit.
3. Tripping over cords can pull an appliance over on a victim causing burns and other injuries.

Suggestions for the purchase and safe use of extension cords.

1. Consider extension cords as a temporary convenience only.
2. Test the receptacle to be sure the appliance plug fits securely, but does not stick.
3. Look for cords with self-closing outlets to cover unused receptacles.
4. Be sure that no plug prongs are exposed when the extension cord receptacle is being used.
5. Use special extension cords with at least 15 amps capacity to carry the load for high wattage appliances.
6. Instruct children not to go near plugs and outlets.
7. Inspect extension and appliance cords for fraying, exposed wires, or loose plugs.
8. Inspect frequently, or use special "right-angle" plugs, where beds or other furniture are pushed up against the wall where the cord joins the plug.
9. Use only 3-wire extension cords for appliances with 2-prong plugs.
10. Use outdoor extension cords with outdoor appliances.
11. Avoid coiling cord during use to prevent possible overheating of the cord.
12. Don't place extension cords under rugs or in other areas where they may be crushed by furniture.

13. Don't attach extension cords to a baseboard or other surface with staples or nails.

WALL OUTLETS

Do not touch a person who has been electrocuted or who has received a shock from a wall outlet, or you yourself may receive a shock. Use dry wood, heavy clothing, a broom, chair, or some other non-conducting material to push the person away from the outlet.

If an outlet is not in use, do not leave it exposed.

1. Insert a plastic safety cap into unused outlet.
2. Use rotary cap outlets.
3. Be sure plug is completely inserted in the outlet with none of its prongs exposed.

WHAT IS YOUR "FLAME-ABILITY QUOTIENT" FOR
EXTENSION AND REPLACEMENT CORDS?

Are you using and maintaining your electrical cords in the safest way possible? Answer the following questions-yes or no-and calculate your FAQ-your ability to prevent unwanted fire, burns, or shock. (Scoring information appears below the last question.)

- Yes___ No___ 1. Do you regularly inspect extension and appliance cords for fraying, exposed wires, or loose plugs?
- Yes___ No___ 2. Do you have any wall outlets in your house that are not in use and not covered by safety caps?
- Yes___ No___ 3. Are all unused extension cord receptacles covered with electrical tape or plastic safety caps?
- Yes___ No___ 4. Do your children ever play with or near cord plugs or wall outlets?
- Yes___ No___ 5. Do your appliance plugs fit securely into the extension cord receptacle?
- Yes___ No___ 6. When you use the extension cord receptacle, are the plug prongs ever exposed?
- Yes___ No___ 7. Do you use the same type (gauge size) of extension cord for both your air conditioner and your radio?
- Yes___ No___ 8. If you are using a grounded appliance (plug will have a rounded third prong), are you plugging it into a properly-grounded three-hole outlet or using a properly-grounded three-hole adapter with a two-hole outlet?
- Yes___ No___ 9. Are any cords in your home placed near radiators or other high heating sources?
- Yes___ No___ 10. Do you ever wrap a cord around an appliance immediately after using it?
- Yes___ No___ 11. Do you have extension cords running under carpets or across traffic areas?
- Yes___ No___ 12. If an appliance is plugged into an extension cord semi-permanently, have you taped the plug in place to prevent children from unplugging it?
- Yes___ No___ 13. Are the cords in your kitchen or bathroom close to water?

What Is Your FAQ continued

Yes___ No___ 14. Do you use extension cords that have either a single slot or a self-closing outlet to cover unused receptacles?

Yes___ No___ 15. Is any extension cord in your home longer than it needs to be?

ANSWERS-You should have answered "yes" to questions 1, 3, 5, 8, 12, and 14. For the remaining questions, the safest answer should have been "no." Tally up your score, giving yourself 10 points for each correct answer.

EVALUATING YOUR FAQ:

150 points - You've mastered the situation. Great Work!

120-140 points - Not a bad score, but still room for improvement.

100-110 points - Your FAQ is "shocking" and, chances are, so are your electrical cords.

Below 100 points - Start from scratch, learn the basics, and improve! In the meantime, be careful.

Housing: Fire Safety Starts at Home

Most fires in the home are caused by carelessness. Such thoughtless acts as tossing away a lighted match, cigarette or cigar, allowing rubbish to accumulate, overloading electric wiring, leaving children at home alone, or by doing or not doing one or more of various "little" things.

How Fire Safe Is Your Home?

Consider your home, room by room, then answer the questions on the Home Fire Safety Check List.

LIVING ROOM HAZARDS

1. Careless handling of cigarettes and matches.
2. Flimsy curtains blowing over open flames.
3. Flying embers from fireplace.
4. Chimneys or fireplaces are dirty and go uninspected.
5. Lamp and extension cords that are worn or broken.
6. Overloading circuits.
7. Television set
 - do not try to repair your own set
 - do not cover up ventilating holes
 - have a UL listed lightning arrestor installed
 - when buying make sure it has been listed by Underwriters' Laboratories, Inc.

DINING ROOM HAZARDS

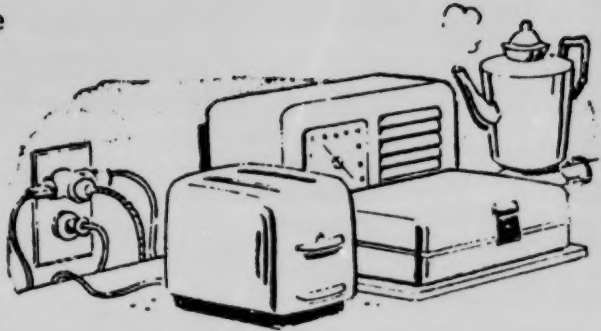
1. Overturned candles.
2. Overloading circuits.

BEDROOM HAZARDS

1. Smoking in bed.
2. Stringing extension cords around the room.
3. Leaving portable heaters running while asleep.
4. Tripping or tipping over portable heaters.
5. Searching closets with lighted matches or cigarette lighter.

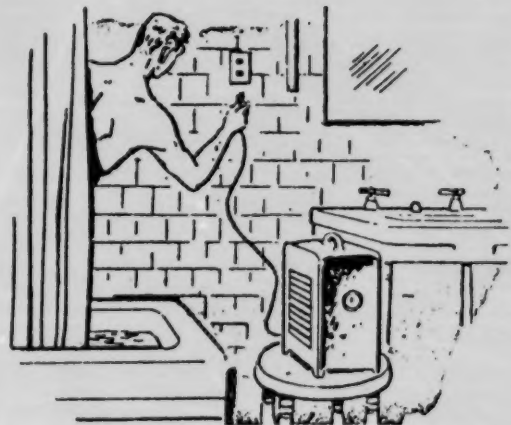
KITCHEN HAZARDS

1. Accumulation of grease in the oven.
2. Burners left on after using.
3. Curtains, towels, hotpads touching flames or hot coils.
4. Using oven space for storage.
5. Leaving cooking foods unattended.
6. Overloading outlets.



BATHROOM HAZARDS

1. Use of electric appliances in the bathroom.
2. Unvented portable heaters.



ATTIC HAZARDS

1. Accumulation of furniture, toys, old clothes, and stacks of magazines.

BASEMENT HAZARDS

1. Accumulation of magazines and newspapers, discarded furniture, old rags, and combustibles that are stored improperly.
2. Dirty furnace.
3. Heating systems not functioning properly.
4. Leaving rubbish or kindling near the furnace.
5. Leaving paints, turpentine, etc., near the furnace.

GARAGE HAZARDS

1. Not keeping gasoline in approved safety cans.
2. Not covering paint cans tightly and storing away from heating devices.

GARAGE HAZARDS

3. Not cleaning up oil drippings promptly.
4. Smoking in the garage.

SOME MISCELLANEOUS HOUSEHOLD FIRE SAFETY HAZARDS

1. Leaving iron connected when answering phone or door.
2. Storing gasoline and flammable or explosive fluid in the house.
3. Cleaning with gasoline.
4. Storing oily and dirty cleaning clothes in closets, cupboards or drawers.

Fire Safety Reminders

Flammable Liquids

1. Store gasoline outside the house, and well away from ignition sources.
2. Store gasoline *only* in containers designed specifically for this purpose.
3. Never use gasoline for cleaning clothing, machine parts, or anything else.
4. Use only fluids labeled Charcoal Starter to light outdoor grills. Never throw *any* flammable liquid on a burning or smoldering fire.
5. Observe good safety rules with these flammable liquids:

Gasoline	Campstove or lantern fuel
Nail polish remover	Paints and thinners
Kerosene	Paint strippers
Furniture polish and wax	Rubber and contact cements
Lighter fluid	Charcoal lighter fluid
Rubbing alcohol	Wood stain

Flammable Fabrics

1. Follow the washing instructions for flame-resistant clothing, to preserve their protective quality.
2. Teach your family the "drop and roll" technique for extinguishing burning clothing.

Upholstered Furniture

1. Keep upholstered furniture away from stoves, ranges, space heaters, and fireplaces.
2. Caution smokers in the family against smoking on upholstered furniture, especially when drowsy, or when taking alcohol or medication.

Space Heaters

1. Every gas or fuel-burning space heater *must* be properly vented.
2. All electric space heaters should have tip-over shutoff switches and protective grilles around heating elements.
3. Use only extension cords which match the electrical requirements of electric space heaters.
4. Never put a portable electric heater in a bathroom or near a sink.

Matches and Lighters

1. Keep matches and lighters where children can't get at them.
2. Fill lighters in a well-ventilated area, away from flames. Avoid spills, or wipe them up immediately.

Smoke Detectors

1. Smoke detectors should be located on each level of your home, and placed near sleeping rooms.
2. Test smoke detectors every two to four weeks.

**You Can
Help Prevent
Fire Accidents!**

Housing: Home Fire Safety Check List

Check your home or apartment to see if you can locate any fire hazard. If you answer NO to any of the questions, you have a potential fire hazard. Take action and correct it.

- Yes___ No___ Are matches and lighters out of child's reach?
- Yes___ No___ Are matches and smoking materials out before disposing of them?
- Yes___ No___ Does each room have a sufficient number of outlets?
- Yes___ No___ Is a qualified electrician used to install or extend wiring?
- Yes___ No___ Are there special circuits for heavy duty appliances?
- Yes___ No___ Are extension or appliance cords fixed or discarded when they become worn or frayed?
- Yes___ No___ Are fuses of the correct size?
- Yes___ No___ Are extension and appliance cords kept from under rugs and carpets?
- Yes___ No___ Are curtains and towels restrained from the area around the range?
- Yes___ No___ Are items stored above the range of no interest to children?
- Yes___ No___ Is the range, including oven and broiler kept clean of grease?
- Yes___ No___ Are deep, wide rimmed ashtrays used?
- Yes___ No___ Is the fireplace screened and clean?
- Yes___ No___ Are all flue pipes, vent connectors, gas vents, and chimneys inspected each fall and cleaned and repaired when necessary?
- Yes___ No___ Is the heating system inspected each fall before use?
- Yes___ No___ Are all heaters set level, and placed out of the way of traffic?
- Yes___ No___ Are portable space heaters turned off before going to bed?

Housing: Home Fire Safety Check List

- Yes___ No___ Are flammable items stored away from space heaters?
- Yes___ No___ Are flammable liquids and aerosols stored in labeled and sealed metal containers?
- Yes___ No___ Is gasoline stored in proper place in specially designed container?
- Yes___ No___ Is gasoline forbidden in starting outdoor grill fires?
- Yes___ No___ Is there a "No Smoking In Bed" rule?
- Yes___ No___ Are irons unplugged when not in use?
- Yes___ No___ Is there sufficient air space around the TV?
- Yes___ No___ Are newspapers, magazines and other rubbish cleared away and not allowed to accumulate?
- Yes___ No___ When purchasing electrical equipment, is the UL label looked for and purchased?
- Yes___ No___ Do you know how to turn in a fire alarm?
- Yes___ No___ Have you worked out a plan of escape from every room in your house?
- Yes___ No___ Have you practiced that escape plan?

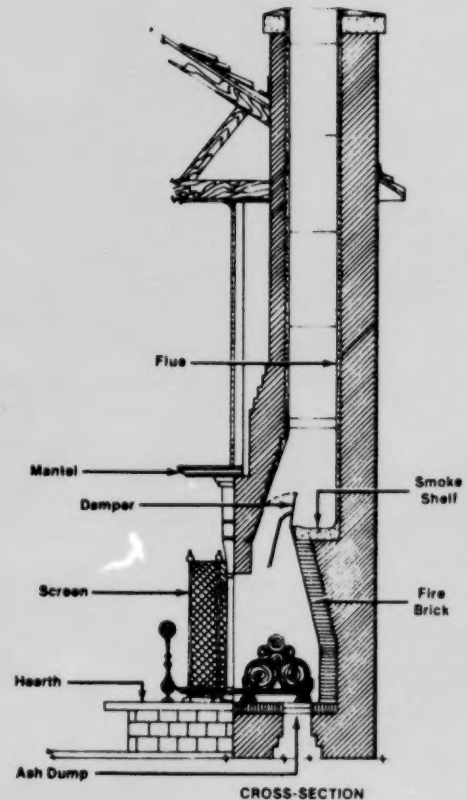
Housing: How Does A Fireplace Work?

FIREPLACE CONSISTS OF THREE MAIN PARTS

1. Fireplace proper - Where fuel is actually burned.
2. Chimney - Where smoke and hot gases are expelled.
3. Hearth - Apron in front of the fireplace.

OTHER SIGNIFICANT PARTS & TERMS

4. Flue - A passageway inside the chimney through which smoke and hot gases travel.
5. Firebrick - Fire resistant lining for the flue.
6. Convection - Process where smoke and heated gases rise naturally into the chimney. This draws fresh air from room into the fireplace.
7. Damper - Is just above the fireplace proper. This is a metal plate which can be controlled manually to close off some of the flue.



A blazing fireplace can be beautiful BUT it can also be a killer if not properly understood and monitored!

THE DO'S AND DON'TS OF FIREPLACE SAFETY

DO use natural wood logs in preference to other materials. If you use artificial logs, be sure to follow prescribed safety precautions.

DO inspect your fireplace and chimney regularly and keep them clean and in good repair.

DO use a good fire screen in front of the fireplace...especially if you are burning highly resinous or damp wood.

DO keep the damper adjusted for a good enough draft to remove all smoke and gases...but without letting the fire get out of control.

DO keep the areas near the fireplace free of flammables...and educate all members of the family about the danger of flying sparks.

DO see to it that the fire is out before going to bed.

DO make sure that your fireplace is a real fireplace and not a "false front" intended merely for decoration.

DO have a fire extinguisher close at hand.

DON'T stack artificial logs in the fireplace as you would wooden logs.

DON'T use your fireplace if it has loose bricks or if it needs cleaning.

DON'T burn coal, charcoal, or plastic materials in your fireplace unless it is properly vented. ..and DON'T burn trash in the fireplace. It's not an incinerator!

DON'T...DON'T EVER use gasoline or other flammable fluids to encourage a fire.

DON'T allow small children to get close to the fireplace...and make sure that any flammables in the room that can be treated for flame-resistance have been.

DON'T leave a fire unattended.

DON'T take the genuineness of your fireplace for granted. It may be a "fabulous fake" that looks like the real thing, without having the real ventilation system.

WHAT IS YOUR "FLAME-ABILITY QUOTIENT" FOR FIREPLACES?

Are you using and maintaining your fireplace in the safest way possible? Answer the following questions-yes or no-and calculate your FAQ...your ability to prevent unwanted flames. (Scoring information appears below the last question.)

- Yes ___ No ___ 1. Does your fireplace have a flue-a passageway for smoke and gases to rise and be expelled through a chimney on the roof?
- Yes ___ No ___ 2. Is your fireplace cleaned and inspected regularly?
- Yes ___ No ___ 3. Do your children ever play around the fireplace area?
- Yes ___ No ___ 4. Do you ever use gasoline or other flammable fluids to ignite or increase your fire?
- Yes ___ No ___ 5. Does your fireplace have a hearth (a brick or stone apron) of ample size?
- Yes ___ No ___ 6. Do you ever use your fireplace to toast marshmallows or broil steaks?
- Yes ___ No ___ 7. Have you ever burned charcoal or incinerated trash in the fireplace?
- Yes ___ No ___ 8. Is your entire fireplace area free of flammable items?
- Yes ___ No ___ 9. Do you regularly check the operating condition of your fireplace's damper control?
- Yes ___ No ___ 10. Do you always keep a fire screen in front of your fireplace?
- Yes ___ No ___ 11. Are all carpets, upholstery, and other such flammables in the fireplace room made of flame-retardant materials?
- Yes ___ No ___ 12. Have you instructed your family-especially the very young or very old-about prescribed rules for fireplace safety?

ANSWERS-You should have answered "Yes" to questions 1, 2, 5, 8, 9, 10, 11, and 12. For questions 3, 4, 6, and 7, the safest answer should have been "No." Tally up your score, giving yourself 10 points for each correct answer.

EVALUATING YOUR FAQ:

120 points - You're a real expert. Enjoy your fireplace with confidence!

90-110 points - So far, so good, but clean up your weak spots.

70-80 points - Be careful. You may have been lucky so far, but your FAQ does not inspire confidence.

Below 70 points - Your fireplace is a disaster. Fix it, board it up, or move!

Housing: For Safety With Flammable Liquids

Accident patterns which occur with flammable liquids.

1. Using flammable liquids to light charcoal fires.
2. Using flammable liquids near sources of ignition.
3. Swallowing flammable liquids.
4. Carrying gasoline in the trunk of your car.
5. Using gasoline around power equipment.

The Federal Hazardous Substances Act establishes 3 labeling categories for liquid products which will burn.

EXAMPLES

EXTREMELY FLAMMABLE - liquids which produce ignitable vapors at room temperature, and even when relatively cold (below 20° F).

Gasoline, white gas, contact adhesives, and some wood stains.

FLAMMABLE - liquids which produce ignitable vapors, but they do so at higher temperature.

Paint thinners, some paints, and automatic products such as brake fluid.

COMBUSTIBLE - the fluid will burn once ignited, but is less likely to catch fire than the 2 other categories.

Furniture polishes, oil-based paints, fuel oil, diesel oil, and kerosene.

The following suggestions are for the safe use and storage of flammable liquids.

USE

1. Never use around any flame source.
2. Start charcoal fires only with fuels explicitly labeled as charcoal starters.
3. Use out-of-doors or in a well-ventilated area.
4. Do not fill gasoline powered tanks when engines are running or while they're hot.
5. Do not siphon gasoline by mouth.
6. Do not store gasoline in trunk of car or strapped to the outside.
7. Do not use as a cleaning fluid for clothing, metal parts or anything else.

STORAGE

1. Keep flammable liquids locked up.
2. Store in a well-ventilated area, outside of house.
3. Try to purchase minimum quantities.
4. If you must store gasoline, store it only in safety cans which have flame arrestors and pressure-release valves. When selecting a liquid for any job-always look for the one that is least likely to ignite.



CHECK YOUR HOME FOR HAZARDOUS LIQUIDS...

Some flammable liquids have a legitimate reason to be in the home; most do not.

Which of the following liquids do you keep around the house? Which are you using and storing properly? Which should you dispose of?

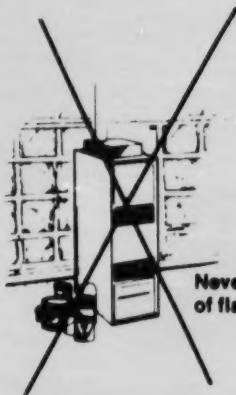
GASOLINE - Never store gasoline in your home. At most, a gallon or two may be kept in a cool location--like your garage--but only in a suitably marked, tightly closed metal container.

BENZINE - You may have a good reason to have benzine in the house--as a dry cleaning fluid or as a fluid for your cigarette lighter. Even then, you should keep the smallest quantity possible on hand...in a tightly stoppered container...stored securely away in a cool place. Benzene (with an "e"), otherwise known as benzol, is a very serious fire and health hazard. Do not use or store it under any circumstances.

DENATURED ALCOHOL - Denatured alcohol may be required for some uses in the home--perhaps as a rubbing solution. While it is not quite as dangerous as some of the hydrocarbons, it is nonetheless highly flammable liquid.

PAINT SPRAYS, REMOVERS, SYNTHETIC THINNERS, QUICK-DRYING PAINTS - These can be very dangerous products because they evaporate easily, and their vapors will accumulate in a closed room. Use them out of doors only, and store them in labeled, tightly-capped metal containers. Do not breathe the vapors.

Some Basic Tips for Flammable Liquids



Never use or keep a flammable liquid near a source of flame or heat.

Don't add fuel to a charcoal fire after it's started, because flames could travel up to the can and cause it to explode. Never use gasoline to start a charcoal fire.

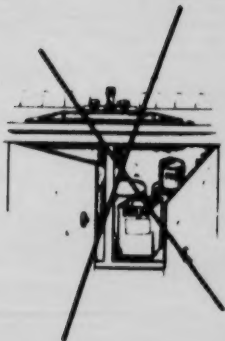


Never store gasoline in your home or car. Flammable liquids must be kept in well-ventilated areas.

If you must siphon gasoline, use a hand-operated pump—not your mouth.



Gasoline should be stored in tightly-capped and labeled safety cans that have flame arresters and pressure-relief valves—never in glass or plastic jugs.



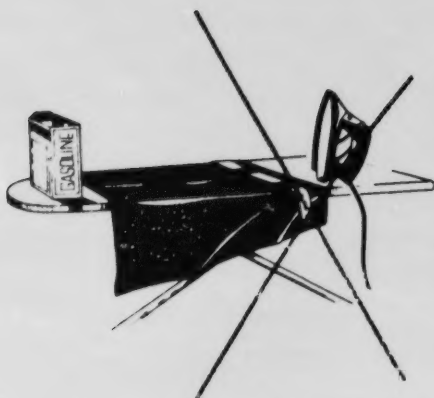
Keep flammable liquids out of the reach of children.

Use only Class "B" fire extinguishers (foam, carbon dioxide, or dry chemical) to put out a flammable liquid fire.



Never incinerate or puncture pressurized containers.

Read directions when using a spot remover, and avoid using near a heat source.



Gasoline is not to be used as a cleaning agent.

If a flammable liquid spills, clean it up immediately. Better yet, use a safety can . . . it won't spill. Be very careful with charcoal fires. Always use them outdoors and treat the lighter fluid like gasoline.

Housing: Floors

Many floor-related accidents are the result of falls on slippery surfaces. Slippery surfaces can be caused by spills, bringing in water, mud, leaves, etc., on shoes from outside, and washing and waxing a floor.

When washing and waxing a floor, remember to...

1. Block off room until completely dry.
2. Be careful not to lay down excess paste wax.
3. Use different mops to wash and wax floor when using liquid self-polishing wax.

When anything is spilled...

Wipe it up or sweep it up immediately.

Additional suggestions for lessening falls...

1. Throw rugs should be anchored some way to the floor.
2. Provide rug to wipe feet on for those coming in from outside.
3. Sweep off porches promptly when it rains or snows.
4. Use extra caution when crossing areas that are wet or icy.
5. Wipe up oil spills in carports, garages, and driveways.
6. Add sand or similar abrasive material to paint before painting porches or terrace floors to make surface slip resistant.
7. Install carpeting wherever possible.
8. Wear shoes made with crepe soles for best protection. Avoid going in stocking feet.

Housing: Furnaces

Accident patterns associated with furnaces.

1. Contact with hot metal grates and other hot surfaces.
2. Carbon monoxide poisoning.
3. Ignition of accumulated fuel vapors.
4. Overinsulating homes so that air intake vents are blocked.

SELECTION

1. Should have a "safety pilot" that automatically stops flow of fuel when pilot light goes out.
2. Have installed according to all local codes.

USE

1. Cover metal grates to prevent touching the hot surfaces.
2. Be sure when insulating your home that you don't cut off air necessary for furnace to burn its fuel properly.
3. Keep flammable liquids away from furnaces.
4. Don't attempt to light pilot light unless you are familiar with the furnace and the proper technique.

MAINTENANCE

1. Have furnace checked at least once every year.
2. Have flues checked to be sure they are not blocked by debris.

Housing: Gas Water Heaters

This appliance, once it is installed, usually sits unnoticed and ignored for years. Many of the accidents associated with gas water heaters happen because victims forgot that the water heater was there. The following suggestions are for the safe use of gas water heaters.

1. Check the anode as over the years it will gradually be eaten away and must be replaced.
2. There should be a safety relief device to take over should the regular thermostat fail.
3. There should be a cut-off device that will shut off the gas if the pilot light goes out or if the water temperature rises too high.
4. Only an experienced plumber should install a water heater.
5. Upon installing a water heater, a temperature and pressure relief valve(s) should also be installed by the plumber.
6. An additional safety device is a thermostatic tempering (mixing) valve on the water supply to tub, shower and sink(s) to help prevent scalding.
7. Never, under any circumstances, use a flammable liquid near a gas water heater or any other open flame.
8. Never store flammable products near water heaters.
9. Warn children not to play with or around the water heater.
10. Follow all directions carefully when attempting to relight a pilot light.

Housing: Glass Doors and Windows

Locations and major accident patterns associated with glass doors, panels, and windows include:

1. Walking or running into, or falling against sliding glass doors.
2. Pushing on the glass portion to open or close storm doors.
3. Slipping and falling, usually because of wet or soapy floors, against glass bathtub and shower enclosures.
4. Walking or running into, or pushing on fixed glass panels.
5. Falling against a window, knocking or striking the glass when opening or closing, or contacting unmounted glass or storm windows in storage.

Selecting Glass Doors.

Install safety glazing when buying new doors or panels or when replacing doors or panels in the home. The four types of safety glazing materials are:

1. TEMPERED GLASS - when broken, it crumbles into small pieces that minimize the chance of serious personal injury.
2. LAMINATED GLASS - is resistant to breakage and if it does break, the pieces generally stick to the plastic and do not scatter.
3. WIRE GLASS - when it breaks, the larger pieces are usually held together by the wire.
4. RIGID PLASTIC - made from one or more layers of plastic heated together and sometimes contains reinforcement material to make it stronger.

Using Glass Doors.

1. Watch where you're going and don't rush.
2. Place a piece of furniture or tall planter in front of fixed panels.
3. Place decals or colored tape on glass doors and panels to show that glass is present.
4. Install safety bars at doorhandle level on sliding glass doors.

5. Install protective screens or grills over the glass in storm doors.
6. Push handle, not the glass, to open.
7. Keep the area in front of glass door clear of loose rugs, toys, and other small articles that causes tripping and falling.
8. Do not allow children to play or run near glass doors.

Glass Shower Doors and Tub Enclosures.

1. Keep bathroom floor dry to avoid slipping and falling.
2. Use suction-cup bath mat or rough surfaced adhesive strips for solid footing in tub or shower stall.
3. Install hand rails on walls to grab.

Using and Storing Windows.

1. Don't knock or bang on windows.
2. Don't leave unmounted glass or storm windows unprotected in storage.
3. Don't push on glass while opening a window.
4. Don't paint window shut.
5. Don't place obstacles in front of windows which reach near the floor.

Matches, Matchbooks, and Lighters

SAFETY TIPS

Use with Care.

1. Close cover before striking.
2. Strike away from yourself and others.
3. Discard damaged or discolored matches.
4. Pay attention when lighting a match.
5. Before you light a match, look around to check for flammable liquids and vapors.
6. Be sure it's out before throwing in trash.

Storing Matches and Lighters.

1. Don't store near flammable materials.
2. Don't store in damp places.
3. Check pockets in clothes going into storage.
4. Do not pack in luggage with other flammable materials.

"DO'S AND DON'TS" OF SAFETY WITH MATCHES

DO buy match books that have a striking surface on the back cover.

DO close the cover of the match book or box before you strike a match.

DO keep only one match book in the same pocket at any one time.

DO remind elderly family members and friends to use matches with caution.

DO choose safety matches rather than old-fashioned "strike anywhere" matches that will light when struck against any surface.

DO store matches out of the reach of young children.

DO teach older children about the dangers of mishandling matches.

DO strike a match away from the direction of the body.

DON'T let young children play or experiment with matches.

DON'T hold the match any closer than an arm's length when you're striking it.

DON'T buy or pick up match books with colorful covers that will attract young children.

DON'T use matches when something else--like driving an automobile is distracting you.

DON'T light candles or cigarettes when you might fall asleep and leave them burning.

DON'T use matches around flammable liquids--especially gasoline.

DON'T use a waste basket for an ash tray.

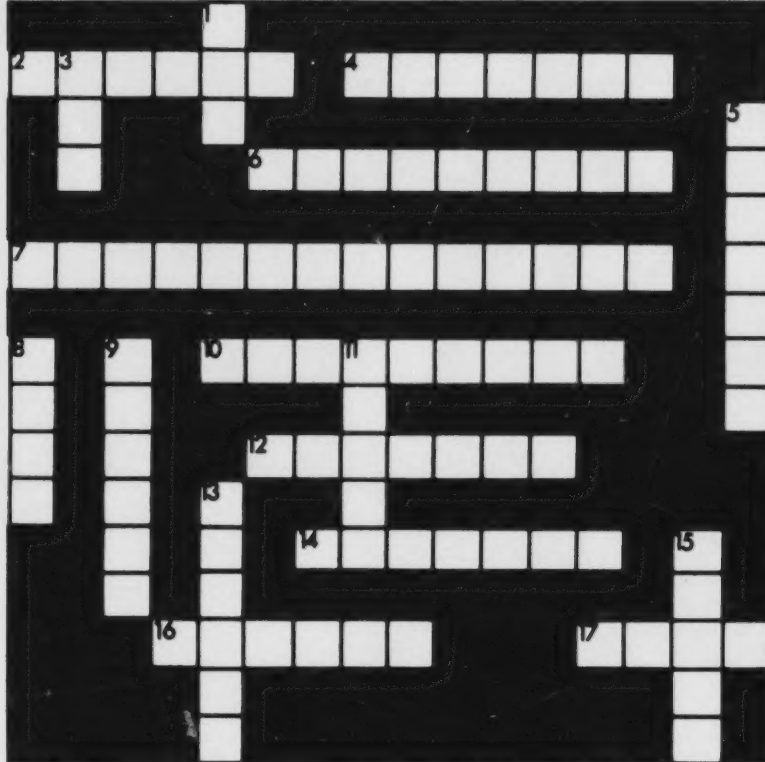
DON'T throw a match away until the flame is extinguished and cool to the touch.

MATCH THE MATCH

TYPE	DESCRIPTION
SAFETY Match	A match that has the ingredients required for ignition divided between the match head and the striking surface.
STRIKE-ANYWHERE or FRICTION Match	A match that has all of the ignition ingredients in the match head. It is ignited by striking it on any surface where friction is created.
WOODEN SAFETY or STRIKE-ON-BOX Match	A type of safety match that consists of an ignition head on a wooden splint. The splint is dipped in paraffin wax which acts to transfer the flame from the match head to the splint. All matches made in this country are treated with an inhibiting agent. This match is commonly made in a small pocket size or a larger kitchen size.
	
DOUBLE-DIP or "BIRD'S EYE" Match	A wooden strike-anywhere match with the head <i>tipped</i> with a very sensitive striking material. Safer than earlier strike-anywhere matches with heads made entirely of the striking material.
BOOK Match	A safety match usually made with cardboard splints. The splints are joined at the base and stapled to a stiff paper cover.
	
FIREPLACE Match	May be safety or strike-anywhere matches. The splints are longer, so they are convenient for awkward or dangerous situations like lighting a fireplace.
	

MATCH CROSSWORD

DIRECTIONS: Select the correct words from the list below to fill in the blanks. Then complete the crossword. (The solution appears on page 14.)



ACROSS

2. Make sure a match has _____ before you throw it away.
4. Don't use matches near _____ that are flammable.
6. Pay close _____ when you are striking a match.
7. " _____ " matches will light when struck on almost any surface.
10. Never light matches where _____ liquids are being used or stored.
12. Keep _____ out of the reach of young children.
14. _____ family members and friends should be reminded about match safety.
16. Colorful _____ on match books will attract young children.
17. Strike a match _____ from your body.

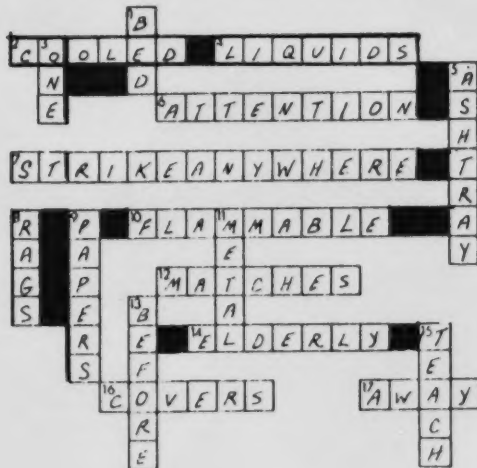
DOWN

1. Play it safe. Don't use matches while you're lying in _____.

WORD CHOICES

- | | | |
|-----------|-----------|-----------------|
| ATTENTION | ELDERLY | GLASS |
| AWAY | FLAMMABLE | CHAIR |
| ASHTRAY | AFTER | PAPERS |
| BED | CHILDREN | RAGS |
| BEFORE | LIQUIDS | STRIKE ANYWHERE |
| WATER | MATCHES | TEACH |
| COVERS | METAL | THREE |
| COOLED | ONE | FABRIC |
3. You should never carry more than _____ matchbook in your pocket at any one time.
 5. A wastebasket is no substitute for an _____.
 - 8-9. Do not strike matches near oily _____ and _____.
 11. Store matches in a closed _____ container.
 13. Close the cover of a matchbook or box _____ you strike a match.
 15. Parents should _____ older children how to use matches safely.

Answers to Match Crossword



PICTURE YOURSELF SAFE

- Hold your



away from your



when you're igniting it.

- Don't use a



when you're



or



- Never put a



away until its



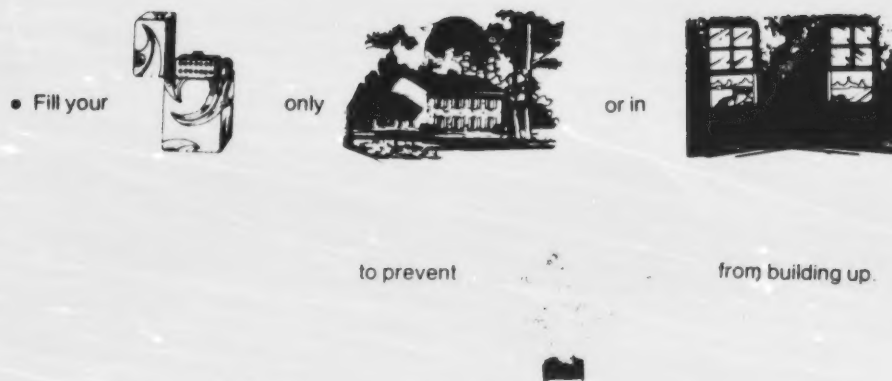
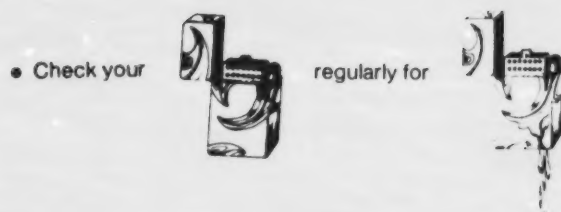
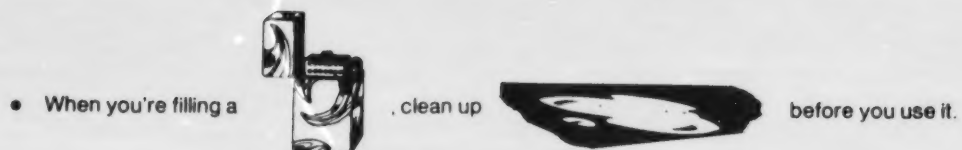
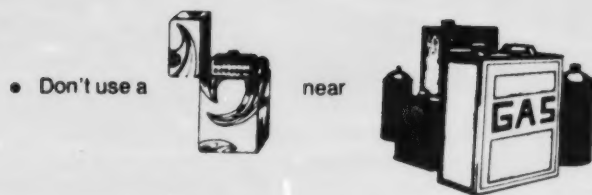
is extinguished.

- Teach



the dangers of using a





Housing: Poisonous Household Products

IT'S ATTRACTIVE!

IT'S BRIGHTLY COLORED!

IT LOOKS LIKE FOOD!

IT'S WITHIN REACH!

AND IT'S POISON!!

Every year thousands of children are poisoned by hazardous household substances. Yet most household poisonings can be avoided-if adults take proper precautions with hazardous products. U.S. Consumer Product Safety Commission has a few suggestions to help you poison-proof your home.

1. Keep hazardous products locked up-children usually can't be poisoned by something they can't get their hands on.
2. Don't depend on close supervision.
3. Always read the warning labels on hazardous products.
4. Keep all hazardous products in their original containers.
5. Avoid taking medicines in a child's presence.
6. Call any medicine by it's proper name.
7. When giving medicines to children, give them only the proper dosage.
8. Promptly dispose of prescription drugs by flushing them down the toilet.
9. Do not store any other hazardous products with medicines that are to be taken internally.
10. Be careful when using a hazardous product. Keep it out of children's reach. If you are interrupted while using the product, take it with you.

EMERGENCY INFORMATION

Child's Name _____
 Birth Date _____ Home Phone _____
 Address _____

Father's Business Phone _____
 Mother's Business Phone _____

Neighbor's Name & Phone _____
 Neighbor's Name & Phone _____

Doctor's Name _____ Office Phone _____ Home Phone _____
 Alternate Doctor's Name _____ Office Phone _____ Home Phone _____
 Dentist's Name _____ Office Phone _____ Home Phone _____
 Hospital Preference _____

Dates of Immunizations:

Tetnus _____ Polio _____ Other _____
 Diphtheria _____ Measles _____

Blood Type _____

Medical Problems:

Allergies:

Medicines Taken Regularly:

Name	Reason	Dose & Frequency
_____	_____	_____
_____	_____	_____
_____	_____	_____

Special Instructions, Precautions, and Other Information:

First Aid Kit Located _____



WHAT CAN YOU DO ABOUT POISONS IN YOUR HOME?

Will you help us prevent an accidental poisoning in your home?
Take this check sheet home and ask your Mother or Father to help you
check your home for poisons.

If any of the below listed potential poisonous items are improperly stored--please relocate: Your child's life may be saved!

<u>POTENTIALLY POISONOUS SUBSTANCES</u>		<u>ACCESSIBLE TO CHILDREN</u>	
Kitchen	Aspirin	Yes _____	No _____
	Furniture Polish, Glues	Yes _____	No _____
	Lighter Fluid	Yes _____	No _____
	Scouring Powder	Yes _____	No _____
	Liquid Polish, Wax	Yes _____	No _____
	Soaps and Detergents	Yes _____	No _____
	Bleach, Drain Cleaner	Yes _____	No _____
	Oven Cleaner	Yes _____	No _____
	Deodorizers, Disinfectant	Yes _____	No _____
	Insecticides, Plants	Yes _____	No _____
Bedroom	Aspirin	Yes _____	No _____
Bathroom	Hair Preparations	Yes _____	No _____
	Medicines or Drugs	Yes _____	No _____
	Rubbing Alcohol, Liniment	Yes _____	No _____
	Shampoo	Yes _____	No _____
	Cosmetics, Creams	Yes _____	No _____
	Nail Polish, Remover	Yes _____	No _____
	Shaving Cream	Yes _____	No _____
	Sleeping Pills	Yes _____	No _____
	Cough Medicine	Yes _____	No _____
	Vitamins	Yes _____	No _____
	Cold Tablets	Yes _____	No _____
	Face Cream, Hand Lotion	Yes _____	No _____
	Perfume, Toilet Water	Yes _____	No _____
	Plants	Yes _____	No _____
Basement	Rat Poison, Insecticides	Yes _____	No _____
Garage	Lawn Chemicals	Yes _____	No _____
Utility Room	Paint & Paint Thinners	Yes _____	No _____
	Gasoline-Kerosene	Yes _____	No _____
	Anti-Freeze, Acids	Yes _____	No _____
	Oil, Alkalies	Yes _____	No _____
	Paint Removers, Glues	Yes _____	No _____
	Varnish, Adhesives	Yes _____	No _____
	Plants	Yes _____	No _____

Store poisons
out of child's
reach under lock
and key.

Store poisons
separately from food
and other edibles.

Bedroom:

Sleeping pills
Birth control pills
Matches and lighters
Nail polish and remover
Cosmetics
Aspirin and medicines
Hair spray
Contraceptive creams



Bathroom:

Aspirin
Laxatives
Medicines
Rubbing alcohol
Cleaners
Epsom salts
Shampoo
Cosmetics
Hair spray
Witch hazel

Garage:

Insecticides
Pesticides
Solvents
Paint thinner
Gasoline
Charcoal starter
Fertilizers
Paints
Paint remover
Kerosene
Waxes and polished
Gardening supplies
Weed killer
Antifreeze
Windshield wiper fluid

Kitchen:

Cleaners
Food extracts and spices
Aspirin and medicines
Ammonia
Insecticides
Soaps
Vitamins
Polishes

Laundry:

Soaps
Dyes
Detergents
Bleaches
Ammonia
Spot removers
Water softner

Workshop:

Solvents
Paints
Paint thinner
Paint remover
Glue
Finishes

FIRST AID SUPPLY CHECKLIST

Every household should have a first aid kit whether its purchased as a commercial kit or purchased by individual items and compiled by you.

Always keep the kit stored in the same place, out of child's reach. Family members and baby sitters should know it's location. Keep the items replaced as they are used.

Absorbent cotton	Petroleum jelly
Adhesive strip bandages	Rubbing alcohol
Adhesive tape	Safety pins
Ammonia inhalant	Salt or salt tablets
Butterfly bandages	Sterile eye pads
Calamine lotion	Sterile gauze bandages
Children's aspirin	Sterile gauze pads
Cotton tipped swabs	Sharp needles
Hydrogen peroxide	Sharp scissors with rounded ends
Large triangular bandages	Thermometer
Drinking cups	Tongue depressors
Measuring cups	Tourniquet
Measuring spoons	Tweezers
Oil of cloves	



Housing: Stairs, Ramps, Handrails, and Landings

Accident patterns associated with stairs, ramps, handrails, and landings.

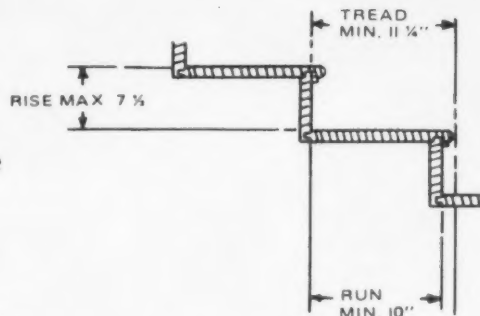
1. Weather factors and obscured vision.
2. Lighting conditions and obstacles on the stairs.
3. Loose carpeting, polished hardwood, slippery footwear; and running near stairs.
4. Railings are loose and when people have their arms full and can't use the railings.
5. The condition of the stairs-broken steps, unstable staircases, and loose concrete.

Suggestions for Accident Prevention.

CONSTRUCTION

1. Stairs-the diagram at the right shows the proper dimensions of interior stairs.

- . run width no less than 10 inches
- . riser height no more than 7-1/2 inches
- . tread width no less than 11-1/4 inches
- . stairway slope between 30 and 35 degrees



For exterior stairs, the risers should be lower and the run should be wider.

2. Ramps-should be long enough to permit comfortable strides (at least 3 feet for 1 stride) and the slopes should be between 7 and 15 degrees.
3. Landings-may break fall before you are seriously injured.
 - . makes it easier for elderly to climb

- . should always be a landing at a door which opens into a flight of stairs.

4. Lighting-should have switches at the top and bottom of each flight of stairs.

USE

1. Wear shoes on stairs.
2. Don't carry packages that obscure vision.
3. Don't use stairs for storage.
4. Use railings whenever descending stairs.

MAINTENANCE

1. Clean exterior stairs after every snow or heavy storm.
2. Repair stairs immediately.
3. Replace burned out light bulbs immediately.
4. Tighten any loose railings.
5. Discard worn carpets and rubber treads.

SAFETY CHECKLIST FOR THE HOME

Would your house or apartment get a passing grade in a home safety test? According to the American Red Cross, home hazards are second only to those on the streets and highways as killers.

- Yes___ No___ Are range and sink areas well lighted?
- Yes___ No___ Do you turn pot handles away from front of range and from other burners?
- Yes___ No___ Are your hands dry when handling electrical appliances?
- Yes___ No___ Do you buy appliances with the UL label?
- Yes___ No___ Are old, cracked, or frayed electric cords replaced or repaired?
- Yes___ No___ Are insecticides, cleaners, and other poisons kept in original containers out of reach of children?
- Yes___ No___ Do you avoid wearing loose, flimsy garments around ignition sources?
- Yes___ No___ Do you cut away from you when using knives and other cutting utensils?
- Yes___ No___ Are you aware of what to do in case of a fire?
- Yes___ No___ Are emergency numbers readily available to your phone?
- Yes___ No___ Do you use non-skid backings on rugs?
- Yes___ No___ Is your fireplace screened?
- Yes___ No___ Do you avoid multiple connections by having plenty of wall outlets in each room?
- Yes___ No___ Do you avoid placing extension or appliance cords under rugs or carpets?
- Yes___ No___ Is good lighting provided in "heavy traffic" areas?
- Yes___ No___ Are large, deep ashtrays provided for those who smoke?
- Yes___ No___ Is a "No Smoking In Bed" rule enforced?
- Yes___ No___ Are sliding glass doors marked so people won't run into them?

- Yes___ No___ Are slippery floors or rugs avoided in front of sliding glass doors or large glass windows?
- Yes___ No___ Are there non-skid mats or surfaces in tubs and showers?
- Yes___ No___ Are medicines clearly labeled and locked up?
- Yes___ No___ Do you read the medicine label before taking?
- Yes___ No___ Do you avoid using hair sprays near open flame or when smoking?
- Yes___ No___ Are nightlights used in bathroom for children and the elderly?
- Yes___ No___ Do you know where the main electric switch, gas and water valves are located and how to use them?
- Yes___ No___ Do you know how to light the pilot lights on your furnace and water heaters?
- Yes___ No___ Are fuses or circuit breakers labeled to identify outlets and fixtures that they protect?
- Yes___ No___ Are appliances properly grounded?
- Yes___ No___ Are poisons kept out of reach of children?
- Yes___ No___ Do you avoid using storage areas for stocking rubbish or combustible materials?
- Yes___ No___ Are tools and appliances unplugged and stored properly when not in use?
- Yes___ No___ Is workshop well-ventilated and well-lighted?
- Yes___ No___ Are heavy duty extension cords used with tools and machinery?

10 - "no" answers-home is reasonably safe.

10-26 - "no" answers-asking for trouble, eliminate some hazards.

More than 26 "No" answers-make sure your insurance premiums are paid.

HOUSING SAFETY QUIZ

1. List 3 ways consumers misuse products that can lead to accidents.
 - a. _____
 - b. _____
 - c. _____
2. What are the 4 most serious bathtub/shower injuries?
 - a. _____
 - b. _____
 - c. _____
 - d. _____
3. List 4 precautions to follow if you use a fireplace in the home.
 - a. _____
 - b. _____
 - c. _____
 - d. _____
4. List 3 of the 4 types of safety glazing materials available.
 - a. _____
 - b. _____
 - c. _____
5. What 2 numbers should be posted near your phone in case of an emergency?
 - a. _____
 - b. _____
6. List some flammable liquids that are commonly found in the home.

7. For each of the following, list 2 potential poisons that might be found.
Bedroom:
 - a. _____
 - b. _____Bathroom:
 - a. _____
 - b. _____Garage:
 - a. _____
 - b. _____Kitchen:
 - a. _____
 - b. _____Laundry:
 - a. _____
 - b. _____
8. Most fires in the home are caused by _____.

9. Electrocutions usually occur when _____ and electricity are mixed.
10. Mrs. Jones is giving her baby a bath and the doorbell rings. What should she do? _____
- _____
- _____
- _____

TRUE or FALSE

- _____ 11. Never leave a child unattended in a bathtub for any reason.
- _____ 12. Never touch any electrical fixture or appliance with wet hands or while standing on a damp floor.
- _____ 13. Since most children can't reach the handles of doors, it's permissible to let them push on the glass panels to open doors.
- _____ 14. Landings make it harder for the elderly to climb stairs.
- _____ 15. There should always be a landing at a door that opens onto a flight of stairs.

HOUSING SAFETY QUIZ ANSWERS

1. Improper mixing
Overuse
Haste
Lack of maintenance
Improper storage
2. Falls
Burns
Electrocutions
Drownings
3. Use natural logs
Inspect fireplace & chimney
Use a firescreen
Keep damper adjusted
Keep flammable items away
from fireplace area
Put fire out before going to bed
Have a fire extinguisher handy
4. Tempered glass
Laminated glass
Wire glass
Rigid plastic
5. Doctor's
Poison Control Center
Emergency Medical Service
Police
Fire
6. Gasoline
Wood stains
Paint thinners
Brake fluid
Furniture polish
Kerosene
Charcoal starter
Some paints
7. Use Handout p.249
8. Carelessness
9. Water
10. Take child with her or
ignore doorbell.
11. TRUE
12. TRUE
13. FALSE - they may push to
hard, break glass and cut
themselves.
14. FALSE - the landings break
the climb and give them a
chance to rest.
15. TRUE

REFERENCES

Materials were selected and reviewed from the following sources, and in some instances were incorporated in the production of the preceding unit.

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INDUSTRIAL EDUCATION

PARENT PERMISSION AND ACKNOWLEDGMENT

Parent acknowledgment of the pupil's activities and an awareness of the teacher's interest in the safety of the child is important. The teacher should express this interest at every opportunity.

At the beginning of each industrial arts course a "permission slip" should be sent home with the pupil for the parent's signature. After it is signed by the parent and pupil, it should be retained on file for the length of time that the pupil is enrolled in the course.

Although the "permission slip" does not relieve the teacher, principal, nor the school district of responsibility, it does fulfill a valuable public relations purpose and it brings home to the parents that their child is engaged in an industrial arts program involving the use of hand and power tools.

On the following page is a sample "permission slip" that can be duplicated for your use.

PERMISSION SLIP AND PUPIL CONTRACT

PUBLIC SCHOOLS
DEPARTMENT OF INDUSTRIAL ARTS

SCHOOL: _____
TEACHER: _____

NAME OF PARENT OR GUARDIAN: _____

(pupil's name) is enrolled in our industrial arts program and will have the opportunity to use various tools and equipment. Appropriate instruction in the proper use of the tools and the equipment is given. Before working with any machine tool, your pupil must successfully pass a written safety examination on the tool. Close supervision is maintained and every precaution is taken to prevent accidents. We are asking your cooperation in impressing _____
(pupil's name) with the importance of being careful.

You are welcome to visit our industrial arts facilities. Please check through the main office.

I give my permission for _____
(pupil's name) to use the tools and equipment in the industrial arts program.

(Parent or Guardian)

I agree to accept the obligation to obey the safety rules of the laboratory at all times.

(Date)

(Pupil)

Please identify any health problems which may have a bearing on your pupil's participation in this class: _____

250

INDUSTRIAL ARTS LABORATORIES

The following space recommendation table is from the 1974 "Guide to Preparing Educational Specifications for Secondary Industrial Arts Facilities," published by the American Council of Industrial Arts Supervisors.

	Square Feet Per Pupil		
	Minimum	Adequate	Desired
General Shop	80	100	125
Crafts	75	100	125
Metals	75	100	125
Drafting	40	50	60
Ceramics	60	70	80
Electricity	60	70	80
Woods	80	100	125
Power Mechanics	75	80	100
Plastics	60	70	80
Graphic Arts	75	80	100

More detailed space allocations for machines are listed in this publication and in the "Guide to Equipping Industrial Arts Facilities" by the American Industrial Arts Association.

AIR CONDITIONING AND REFRIGERATION

JOB SAFETY REQUIREMENTS

Safety education for pupils of the air conditioning trade is made complex due to the wide variety of jobs and equipment encountered throughout the industry.

The following quotation from an actual job description for a journeyman air conditioning equipment mechanic points up the safety problems a mechanic gets involved in. Although not obvious at first glance, practically every job mentioned has its own peculiar safety standards.

Performs preventive maintenance, major repairs, seasonal maintenance, and trouble-shooting of all air conditioning, refrigeration, ventilation and compressed air systems. Major repairs and seasonal maintenance consist of disassembly, inspection, repair, reassembly, test and adjustment of refrigeration equipment components. Systems include reciprocating, centrifugal, and absorption units utilizing chill water or direct expansion. Adjusts or calibrates operating and limit controls. Checks systems for leaks, abnormal operating conditions, and oil levels in compressors. Cleans and replaces filters, packs pump shaft and valve glands. Maintains alignment in couplings between pumps, compressors, and motors. Cleans cooling towers and strainers and assures correct water level is maintained and that water is properly distributed over decking. Repairs or replaces component parts such as belts, bearings, valves, evaporators, condensers, compressors, control devices (electric, pneumatic and electronic), piping, etc.....

Quoting further, the position specifically requires safety training:

....Must know and apply the principles, materials, and safety standards applicable to repair and modification of air conditioning equipment. This includes interpretation of plans, blueprints, and engineering design; use of tools and test equipment; and the ability to plan and competently accomplish assigned duties.

Pupils must be taught to understand and practice safety standards drawn from several trades as opposed to concentrating on one or more specific machines or working areas. They must also be made aware that

when they enter the world of work they become responsible not only for their own safety but for the safety of others as well. As a matter of law, service and installation personnel may be held liable for property damage, injury, or death caused by their unsafe work. In such cases lack of knowledge is no excuse. The time for the pupil to learn safety standards is now!

GENERAL PROCEDURES

1. Cutting tools should be kept sharp and stored in a safe place. They should never be placed in clothing pockets.
2. Box end type wrenches or sockets should be used whenever possible. They are less likely to slip than open end and other type wrenches. To help prevent slippage, a wrench handle should be pulled, never pushed.
3. Impact goggles or faceshields must be worn at any time there is danger of flying chips, sparks, liquid refrigerant, or any other material that may cause eye injury.
4. Small parts should always be held securely in a vise while being worked on.
5. Electrically powered hand tools must never be operated without a ground.
6. Observe accident prevention signs. Warning signs are posted for one reason only--to prevent accidents. Obey them!

SHOP SAFETY

BASIC SHOP SAFETY

This unit is designed to teach the pupil to work safely in a typical school shop. The individual teacher should supplement this subsection to meet local requirements. Specific machines, materials, and equipment are covered separately in this Handbook and should be incorporated into courses of instruction when applicable.

HOUSEKEEPING

Broken bones, cuts, gouges, bruises, burns and many other injuries can result from poor housekeeping. The prevention of these injuries is simply to practice good housekeeping. Some of the more important items to consider in keeping the shop in proper order are given here:

1. Keep all floors and walkways clean, dry, and free of oil or grease. If oil or grease is spilled, clean it up immediately. Slipping and falling could result in a serious injury. Spilled refrigeration oil is especially dangerous.
2. Insure that the shop is adequately ventilated at all times. Fumes and vapors generated in normal shop activity may be injurious to your health. Special care must be taken during brazing operations.
3. Work only in well-lighted areas. Efficient and safe work cannot be performed without proper lighting. Check the lighting system frequently and report burned out lamps or other lighting deficiencies.
4. Don't leave tools scattered. If at all possible, safe mechanics work from a tool pouch or tool box. Never place tools on top of equipment which is running. Vibration will cause the tools to "walk" and they are prone to end up in control panels or fans.
5. Don't clutter the work area with unnecessary equipment.
6. Keep all ropes, chains, cables, hoses, and electrical extension cords properly stored when not in use.
7. Use extra care in disposing of scrap metal, tubing, wire, glass, etc. Ensure that all parts of the materials are well inside the waste container. The sharp edges of these materials will cut and tear your skin as well as your clothes.
8. Place all oily rags in an approved container.

HORSEPLAY

Some of the common varieties of horseplay are pushing, shoving, tripping, directing compressed air toward another pupil, shocking with electricity, applying the "hotfoot", squirting water or oil, etc. Horseplay in any form must not be tolerated in the shop.

ROWDYISM

Running, shouting, throwing, banging, slamming doors, or similar distracting conduct in the shop falls into the same category as horseplay and cannot be tolerated.

PROPER WORKING METHODS

Equipment which has exposed moving parts such as belts, chains, flywheels, moving arms, etc. can be a serious safety hazard unless care is exercised during its operation and maintenance. While most moving parts of machinery are enclosed in protective guards of one kind or another, alertness on the part of the operator or mechanic is essential. Gloves, neckties, long hair, or loose clothing, particularly large loose sleeves, should not be worn around moving machinery.

Any adjustment, cleaning, lubrication, or repair of moving machinery should be accomplished with the device stopped if at all possible. If it is not possible to stop the machine, extreme care should be observed to prevent injury.

Lifting objects improperly can cause serious back injury. Pupils should never attempt to lift heavy loads. When such objects must be lifted, the teacher should be consulted before any attempt at lifting is made.

When possible, use hand tools so that the working force is always directed away from the body. This will minimize the chances of injury in case the tool should slip. One exception to this rule is the use of wrenches. Refer to Section VIII for indepth information.

When handles of hammers, sledges, files, and other tools become splintered or loose, replace them immediately.

Mushroom heads on cold chisels, punches, drift pins, hammers, and other similar tools should be dressed down as soon as they begin to check and curl.

SAFETY ON THE JOB

The safety on the job unit is designed to prepare the pupil to intelligently cope with the hazards commonly encountered in the air conditioning industry. It may be used in an integral part of the safety course or as a source for "related" safety instruction.

PHYSICAL INJURIES FROM MECHANICAL CAUSES

These originate from moving machinery, handling heavy crates or blocks of ice, falls, or from the use of tools. They constitute the largest percentage of accidents in the refrigeration industry. In this category are:

1. SMASHED FINGERS, TOES, HANDS OR FEET--from being hit with hammers or from having heavy objects dropped on them.
2. CUT OR TORN FLESH, OR EYES PUT OUT--from slipping screw-drivers, saws, drills, or other edged tools.
3. BEING STRUCK BY PARTS DISLODGED AND THROWN AT HIGH SPEED--from moving machines.
4. BROKEN ARMS, LEGS, OR OTHER SERIOUS ACCIDENTS--from being caught in moving machinery or drawn in by clothing or gloves caught in machinery.
5. FALLS--from ladders or on slick floors.

Some protection from this type of accident can be afforded by guards on the machines, automatic trip switches, electric eye, and other mechanical and electrical protective devices; but the best safeguard is the constant vigilance of the worker.

USE OF TOOLS

1. keep tools clean and in good condition. Screwdriver blades should be kept sharp and square; handles should be of a non-conducting material.

2. Use the right type and size of tool. Use box wrenches in preference to end wrenches; use adjustable wrenches as little as possible; do not use files as punches or gouges; they are brittle and shatter.
3. Use handles on files.
4. Do not put edge tools (such as chisels, punches and open knives) in the pockets, even temporarily; keep guards on sharp edges or points of tools in tool kits.
5. Push sharp tools away from the body instead of drawing them toward the body.
6. Whenever possible, do not hold screw or work with one hand, then push screwdriver, chisel, or punch with the other.
7. Keep the face away from the tool; eyes have been put out with screwdrivers.
8. Wear goggles when grinding tools, or when working on any job that may involve flying pieces of material.

MISCELLANEOUS PRECAUTIONS

1. When working around moving machinery, do not wear gloves; avoid ties or loose clothing that may get caught in the machine and cause severe injury.
2. Finger rings are dangerous, and should not be worn when a technician is at work.
3. Do not stick fingers or tools into moving machinery, nor into automatic machines or fans that may start suddenly.
4. Place ladders carefully, with both legs of the base of the ladder secured, and at a distance from the wall equal to 1/4 of the length of the ladder.
5. When moving heavy machines, use skids, properly braced against slippage. When lifting heavy loads, lift with the legs instead of the back.

When using portable electrical tools, use a three-wire cord, one wire of which is a ground wire and is connected to the drill motor frame. If the system is "polarized," (that is, if the ground wire or neutral wire as it is also called) is continuous and can be identified, and the plug is so designed that it can be put into the receptacle in one way only, the motor frame should be connected to this ground wire. Equipment motors should be permanently grounded when they are installed.

Do not use extension cords or connection cords that have frayed or damaged insulation. Tape up the damaged section with a layer of rubber tape or plastic electrician's tape. If the wires are damaged, reconnect them. If possible, solder them or use an approved solderless connector; then retape them.

Electrical equipment, especially if it has been approved by the Underwriters' Laboratories, is usually provided with adequate protective insulations, barriers, and safety devices. But, these cannot ensure against unsafe, careless and "take-a-chance" practices by those who install, repair, service, maintain, or operate the equipment. The worker's own care and watchfulness are his/her best protectors.

Do not overload electric lines. Consult your local electrical code, or the National Electrical Code, as to permissible wattage and current for various sized wires. Refuse to install equipment that will add load above allowable limits.

Use only properly sized fuses. Never bypass fuses.

INJURIES DUE TO HIGH PRESSURE

A basic characteristic of mechanical refrigeration is the use of various fluids, both gases and liquids, that are at pressures above atmospheric pressure. They must therefore be contained and transmitted in tanks, pipes, and other vessels so constructed that they will not allow the fluids to leak, and are strong enough that they will withstand maximum pressures without splitting or bursting under extreme conditions of use.

It is also a basic characteristic of mechanical refrigeration that these pressures change with changes in temperature, or are increased by compressors or pumps. Therefore, guard against extra pressures caused by compressors and pumps as well as the pressures existing in the system because of variations of temperature.

Pressure-containing vessels and tubes are so designed and constructed that they will withstand normal pressures caused by normal

temperatures, and by normal degrees of compression and normal filling of the vessels. If the vessel or tube is overheated, if an attempt is made to put too much fluid in it, or if the fluid is compressed above the pressure for which the vessel is designed or constructed, the vessel will "give" somewhat, until it reaches its limit of elasticity; then the vessel will burst, often with explosive violence.

Over-pressure may cause large parts (such as the soldered ends of dryers or of receivers) to be blown out. Over-pressure may also drive plugs or other small parts out with projectile speed.

If a cylinder, or any other vessel, shows a bulge, however small, immediately relieve the pressure, for it may burst at any minute.

HYDROSTATIC PRESSURE

Explosions or bursting of vessels from over-pressure, are frequently caused by overfilling the vessels with liquids at lower temperature; then when the vessel (completely filled with liquid) warms up, the liquid expands and exerts tremendous hydraulic pressure, usually referred to as "hydrostatic" pressure.

Liquid pumping or "oil-slugging" by a compressor can be dangerous. Ports of discharge valves, are only large enough to pass high pressure gas that is reduced in volume when compressed. They will not pass enough oil or liquid refrigerant.

As a result, something has to give; and, it is the weakest part that gives. Sometimes it is a rod; sometimes the shaft or spokes of the compressor pulley. Sometimes it is the compressor head, and they may be most dangerous. Do not allow compressors to "pump oil". It not only damages the compressor, but it is quite dangerous.

CHANGING REFRIGERANTS

It is often dangerous to use some other refrigerant in a system than the one for which it was designed, especially if the substituted refrigerant has higher pressures and/or requires a greater volume of refrigerant than originally recommended.

REFRIGERANT CYLINDERS

Refrigerant cylinders are designed and constructed for definite maximum pressures and for definite quantities of refrigerant that are based on specified maximum temperatures, usually 130° F. If the cylinders are subjected to temperatures above those specified, the liquid expands to entirely fill the cylinder; extremely high hydrostatic pressures develop, and the cylinder bursts.

Flying pieces of the cylinder may be at bullet velocity, or in case of small cylinders or light containers, the container itself may travel as a rocket at projectile speed. Sometimes of equal or greater danger is the refrigerant itself from bursting cylinders; men have been blinded or severely burned by corrosive refrigerants or suffered freezing injuries by any refrigerant.

Many factory cylinders are equipped only with fusible plugs, which offer no protection against overfilling; nor in fact, do they offer adequate protection on most cylinders, against excessive temperatures. Fusible plugs melt at about 160° and most cylinders are liquid-full at 130°, so the fusible plug gives no protection between 130° and 160°.

All refrigerant cylinders should be protected by means of pressure actuated relief valves, especially service cylinders, for they are more often abused by overfilling than factory-filled cylinders. Small combination service valves with built-in pressure relief safety valves were developed by valve manufacturers in cooperation with the RSES Safety and Educational Department and are available at moderate prices from refrigeration supply wholesalers. Every service cylinder should be equipped with one of the safety valves.

Even with the best of care, cylinders become rusted, damaged, or otherwise weakened after several years of use, and should be retested by an ICC approved hydraulic test to see if they will stand the required pressures. The Inter-State Commerce Commission requires a retest of all service cylinders, and most factory cylinders, once every five years. Do not use cylinders beyond the five year period without having them retested. It may save life or prevent serious injury.

Do not overfill cylinders, and do not put a flame on them. Do not place cylinders in a hot place or near or against a hot object, such as a stove, radiator or boiler. To do so invites accidents.

PRECAUTIONS

1. Do not overfill containers.
2. Do not allow pressure-containing vessels to become overheated.
3. Do not put a flame on a refrigerant cylinder, receiver, or other vessel that may contain liquid refrigerant.
4. Do not change to a higher pressure refrigerant without first checking to determine if the equipment is strongly enough constructed for the higher-pressure equipment.
5. Always put on both low and high pressure gages before servicing a system. Observe these gages frequently.
6. Before loosening bolts or screws, see that the pressure in the part

has been relieved. Gaskets may hold the pressure temporarily, but release suddenly, throwing the full charge of refrigerant in the face of the worker. There have been numerous accidents of this nature, resulting in blindness or other serious injuries.

7. Use pressure relief valves on all refrigerant cylinders and other vessels that may be subject to excessive pressures.
8. Do not allow a compressor to liquid pump or "slug oil."
9. Keep the mind on the work.
10. Be vigilant.

FIRE HAZARDS IN REFRIGERATION

The fire hazard connected with working on or with refrigerating equipment, may be classified under six chief sources; refrigerants, other gases, solvents, fuels, construction materials and refrigerated products.

REFRIGERANTS

The refrigerants used in mechanical refrigerating systems may be divided as to flammability into three classes.

NON FLAMMABLE REFRIGERANTS--These refrigerants will not burn, and, except air, will not support combustion. Some of them can even be used as fire extinguishers. Refrigerants classed as non flammable are: carbon dioxide; the fluorinated hydrocarbons; and, of course, air and water, which are used as refrigerants in certain types of equipment.

MODERATELY FLAMMABLE REFRIGERANTS--In this category are the refrigerants that are flammable only in mixtures of rather narrow limits of percentages of air in the mixtures of the refrigerant and air. Nevertheless, the mixture may happen to be just right, and the refrigerant will then burn or explode if confined. Therefore, these refrigerants must be considered as flammable, treated with care, and not exposed to flame or electric spark that will ignite them. Ammonia and methylchloride are about the only two common refrigerants in this classification.

HIGHLY FLAMMABLE REFRIGERANTS--The refrigerants in this classification are not commonly used in refrigeration, especially in the smaller sized machines. Some of them (notably: propane, propylene, ethane, and ethylene) are in limited use in 2-and 3-stage, ultra-low temperature installations; several (including propane, ethane, and methane) are used

in some large industrial installations in refineries. Isobutane, formerly used to a limited extent in household refrigerators, is in this category. These highly flammable refrigerants are derived from natural gas or petroleum. Several of them, particularly butane and propane are in common use as fuels under the name LP (liquified petroleum) or "bottled" gases.

OTHER GASES

Although not used as refrigerants, there are several other gases so widely used by the refrigeration industry, that they deserve discussion in connection with the subject of flammability.

ACETYLENE--This fuel gas, when burned in a simple torch that mixes the acetylene with air, gives a flame suitable for soft soldering, small silver-soldering and brazing, and other low heats such as "lead burning," etc. When burned in a torch that mixes oxygen with the acetylene, the flame is very hot, sufficient for heavy brazing, welding and cutting.

Acetylene is, of course, highly flammable and must not be allowed to escape into a room, for a flame or an electric spark may ignite it.

OXYGEN--Although oxygen is not flammable, it must be handled and regarded as just as dangerous as a flammable gas, for it is the element that must be present with a flammable gas to permit combustion. Oxygen is dangerous in another way. It combines so rapidly with oils or other flammable materials, that "spontaneous combustion" may occur, that is, the flammable material may burst into flame or explode without being ignited by a flame or spark. Never allow oxygen to come into contact with oil. Never oil the fittings on an oxygen cylinder or line (glycerin may be used). Never use oxygen to obtain test pressure in any part of a refrigerating system. Even though the worker may think that it is empty, there may be a film of oil in it.

HYDROGEN--This extremely flammable gas is used quite extensively in factories and large shops instead of acetylene; when burned with oxygen, it produces a very hot flame. Hydrogen must be treated with the utmost care. It has little odor and is very light.

CARBON DIOXIDE--(CO_2) In addition to being a refrigerant, carbon dioxide is widely used by refrigeration service engineers as a pressure gas for testing and blowing out coils and other parts. It is "inert" to practically all materials used in refrigerating equipment and makes a good gas for such purposes. CO_2 is composed of carbon and oxygen, but is entirely non-flammable. In fact, it is formed when carbon or fuels (nearly all of which contain carbon) are burned. Carbon dioxide, is used to put out fires, because it forms a "blanket" that smothers the fire.

NITROGEN--This is another inert gas that is used for pressure testing and blowing out coils. Like carbon dioxide, nitrogen is non-flammable and does not support combustion.

FUELS

Natural gas, artificial gas (manufactured gas), L.P. gas (butane or propane), kerosene, fuel oils of various grades, and gasoline, are classed as fuels. Also classed as fuels are acetylene, alcohol, and other liquids used in torches. All of these are highly flammable; and, if confined, are explosive. They must be handled with care. Guard against spillage and accumulation of vapors from the liquid fuels, or escape of the gaseous fuels.

CONSTRUCTION MATERIALS

Some of the materials used in the construction of refrigerating equipment, especially of the cabinets and fixtures, are flammable. Among these are the lubricating oils. When in their proper containers or in the equipment itself, they do not often present fire hazards. However, due to over-oiling, leaking seals, loose bearings, or defective oil cups and reservoirs, lubricating oils are often thrown on the equipment and ignited, thus causing a bad fire.

Keep machines clean! This does not mean merely wiping the worst off. It means wiping them dry, including places difficult to clean, such as finned condensers, motors, etc. If necessary, remove them and do a good job of cleaning them. An oily machine is a frequent source of a big fire. Cleanliness of equipment cannot be over-emphasized.

Other flammable construction materials, are some of the cabinet insulations, such as cork, celotex, kapok, felt, paper, sawdust and shavings, and various wood or vegetable fibers. When using a torch around these or on wood walls, protect the flammable material with a sheet of asbestos. A small piece of the insulation or wood may smolder, and later burst into flame. Some of the binders used in insulations, such as hydrolene, pitch, tar, resins, etc., are quite flammable and burn fiercely. Electrical insulation is usually flammable; for cotton, rubber, linen, paper, plastics, varnishes, and waxes are common ingredients of electrical insulation. Electrical insulation especially if oil soaked, is a frequent source of fires.

REFRIGERATED PRODUCTS

The major application of refrigeration is in the preparation and preservation of foods and beverages, which for the most part are non-flammable under refrigeration conditions. However, in air conditioning, the spaces cooled have many materials that are flammable. So, care

must be exercised during installation and service that carpets, furniture, linoleum, draperies, and such merchandise as clothing, are not subjected to conditions brought on by the worker or by the equipment, that may start disastrous fires.

INJURIES DUE TO EXPLOSIONS

Explosion and flammability are so closely connected that all that has been said in the previous section on flammability applies to explosion. If a flammable gas ignites in the open, it burns. It may be dangerous in burning, not only to the premises but to the service engineer. If the gas is confined (or worse, compressed and then ignited), it seeks more room, so it pushes with tremendous force. It "explodes" or causes an "explosion." Therefore, the only practical differences between a gas catching fire and a gas exploding is that with the explosion there is violence and physical damage as well as flames.

BREATHING TOXIC GASES

Literally, the word "toxic" means "poisonous"; so "toxicity" is the condition of being poisonous. Spoiled food is toxic; a rattlesnake's bite is toxic.

In refrigeration, the term "toxic" is more frequently used with gases that we may breathe, and which poison us by being taken into our blood by means of the lungs.

Refrigerants, and other gases that we use in refrigeration work, vary a great deal in their degrees of toxicity. Some, such as ammonia and sulfur dioxide, are so highly toxic that it is dangerous, as well as unpleasant, to breathe air that has only a few parts of these gases in a million parts of the air. Others, such as methyl chloride, ethyl chloride, methylene chloride, and most of the straight hydrocarbons, may be breathed in larger percentages in air before they become dangerous. Still others, such as carbon dioxide and Refrigerant-12, may be breathed in large percentages with air without noticeably harmful effects.

It must be remembered, however, that Nature's gas for us to breathe is air. Any other gas is harmful, its harmful effects depending upon the nature of the gas itself, its concentration in air, and how long a time it is breathed.

ASPHYXIATION

Ammonia and sulfur dioxide gases are very powerful. They immediately attack the eyes, throat, and mucous membranes, producing such painful effects that anyone exposed to them attempts to get away from the gas as soon as he/she can. A person may have the eyes, throat and lungs burned severely by ammonia or sulfur dioxide by the time he/she gets away from them, but not often is he/she overcome because of sufficient warning.

The danger from asphyxiation, or being made severely ill from breathing gas, is more apt to occur if the gas has little or no odor. The person may breathe enough of the gas, especially over a period of time, that he/she scarcely realizes that toxic gases have been inhaled. This is true of methyl chloride, ethyl chloride, and in general, the straight hydrocarbon group of liquified gases.

These gases are very insidious. They are dangerous in a short time if the percentage of the gas in the air is very high; or, if the percentage of gas in the air is small, they can be breathed for a longer time. That is, the effect of these gases is cumulative, for the effects keep building up, until finally the system (especially the liver and kidneys) become so affected that almost all at once the person is very sick.

Artificial or natural gas used in cooking, heating, and water heating, has a distinctive odor. If such an odor is detected, ventilate the room before attempting to work in it. If the odor is strong, be careful about going into the room even to open a window. Put on a gas mask. A cloth over the mouth or nose, wet or dry, is not a gas mask, but many people have died thinking that it was. No one is immune to asphyxiation. Take no chances. Be vigilant always. If a person is overcome by gas, he/she first feels drowsy, and perhaps nauseous. If the person gets a heavy concentration of gas, he/she becomes weak; their knees give way; and finds that although conscious, he/she cannot walk or crawl. Unconsciousness and death follow.

OXYGEN DEFICIENCY

Even if a gas were completely harmless chemically, it still would not support life unless it was mixed with approximately 20 percent oxygen, which is necessary for the human body. If there is so much gas in the air that there is not enough oxygen left, we cannot long exist in such a mixture. This is known as "oxygen deficiency" and is not quite the same as toxicity, but just as fatal.

DECOMPOSITION OF GASES

Some gases, that may have high safety ratings or moderate safety ratings in their natural state, become highly toxic if they are exposed to flames or hot surfaces (such as hot plates, etc.) about 900° F or higher. The heat "decomposes" these relatively safe gases; that is, it breaks them down and causes them to form other gases that are very toxic.

The thus decomposed refrigerants are those that contain one or more of the "halogens" (a group of elements that include chlorine or fluorine). Thus, any of the refrigerants that have the symbols Cl or F in their chemical symbols may decompose. These gases are highly poisonous and must be avoided. Fortunately, they have an acrid, unpleasant odor, so that their presence is noticeable. The gas may not noticeably affect the person breathing them for several hours, so the person should get out of the place contaminated by them as soon as he/she smells them.

The cleaning solvent, carbon tetrachloride (CCl₄), is in the same category as the refrigerants that decompose. The fumes of carbon tet also decompose into toxic gases, so carbon tet, toxic in itself, is doubly so in the presence of flames or hot surfaces. Also beware the gases from burning plastics; one of these may be deadly phosgene.

OTHER GASES

ACETYLENE--Although not highly toxic, this gas should not be breathed unnecessarily.

NITROGEN--This is an inert gas, and is not absorbed by the lungs. It is therefore harmless in itself if sufficient oxygen is present. The air in our atmosphere is 78% nitrogen.

CARBON--This is the element in coal, oil, natural gas, wood, etc., that "burns." In burning, it unites with oxygen, thus forming a gas that is called carbon-dioxide (CO₂), one part carbon, two parts oxygen. It is a comparatively harmless gas, but can result in oxygen deficiency if it is in the air in too great a percentage.

CARBON MONOXIDE--This gas is also formed during combustion. It is one part carbon and one part oxygen. It is highly toxic and very dangerous. It is doubly dangerous in that it has no odor, and therefore kills without warning. It is the gas that is chiefly responsible for deaths in closed garages, or even in a closed automobile with the engine running.

If there is a fire in the room, see that these gases of combustion have a vent, such as a chimney or an exhaust fan. Moreover, any room that has open flames or very hot surfaces should be ventilated, to prevent the accumulation of carbon dioxide and carbon monoxide.

PRECAUTIONS

If the nature of the various refrigerants and other gases and fumes are understood, and if reasonable care is exercised, a refrigeration service engineer need have no fear of possible toxic hazards from refrigerants. However, the engineer must use care, and in particular he/she should observe the following rules.

1. Don't breathe any gas any more than is absolutely necessary. None of them are harmless under all conditions.
2. Don't ignore the possible danger of a gas just because it has very little odor. The odor of a gas is no indication of its toxicity.
3. Don't discharge any gas into any unventilated room.
4. Don't discharge any of the halocarbon gases into a room in which there is a fire, flame, or electric heating element.
5. Don't hesitate to use a gas mask if it is necessary to enter a room that you know or suspect has any of the toxic gases in it.
6. Don't leave leaks in refrigerating equipment; these leaks may fill the room with gas and cause trouble to someone.
7. Don't run an automobile engine in a closed garage; and don't sit in a closed car with the engine running.
8. Don't use questionable tubing, flexible hose or connectors. Replace them if they appear suspicious.
9. Don't leave old refrigerators or freezers where children can lock themselves in. Many children are smothered to death this way every year. Remove the locks and hinges.
10. Don't breathe fumes from acids, caustics, carbon tetrachloride, benzol, ketone, xylene, or other toxic cleaning materials. Always keep rooms well ventilated when using cleaning solvents.
11. Be vigilant at all times.

REFERENCES

Materials were selected and reviewed from the following sources, and in some instances were incorporated in the production of the preceding unit.

RSES--Refrigeration Service Engineers Society.

AUTO MECHANICS

The safe auto mechanics lab should provide at least 85 square feet of work area per pupil. The total area recommended for a Power or Transportation Lab is from 1,800 to 3,000 square feet of floor space for a class of 20 to 24 pupils.

Repair work done on automobiles and trucks is inherently very hazardous. The professional mechanic is constantly exposed to many types of service-related injuries. Injuries do occur, but most of them are usually minor in nature and result in cuts and bruises to the hands and arms. The experienced mechanic has learned how to avoid most of these, but will still suffer occasional injuries. However, just one act of carelessness can result in a serious injury. Loss of fingers, hands, eyes, and even life itself can and does occur. The auto mechanics pupil has neither the skill nor the experience of the professional mechanic and is consequently much more likely to be injured.

No safety rules can replace the common sense use of tools and machines; nor can they cover all the situations that the pupil will experience. The teacher must accept the responsibility for teaching pupils to work safely. Also, the teacher needs to caution and recaution them about the importance of adopting safe work habits. He/she must protect them from exposing themselves to any situation that could cause a really serious injury. The following general rules will help in making the auto mechanics lab safer for the pupil and the teacher.

1. Always obtain permission from the teacher before the initial starting of any shop engine following major repair on the engine or drive line.
2. Have a fire extinguisher nearby when a carburetor is being primed, or when a newly overhauled engine is being started for the first time.
3. Jack at least one rear wheel off the floor when starting a newly overhauled engine for the first time.
4. No engine shall be started unless there is a mechanic sitting in the driver's seat, ready to shut the engine off, if needed.
5. If more than two pupils are working on one car, only one of them will give instructions to the driver. All the pupils must keep their hands off the engine and radiator at this time.
6. Exercise extra care when making adjustments on a running engine. There is danger around belts, fans, gears, hot exhaust parts, etc.

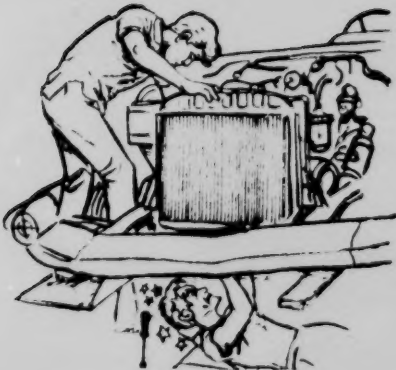
7. No pupil will be allowed underneath a vehicle that is raised from the floor unless safety stands are in place.
8. Do not choke the carburetor with the bare hand; use the choke valve.
9. Do not look into the top of the carburetor while the engine is cranking or running. A backfire can burn the face before one can move away.
10. If any engine does not start within a reasonable time, notify the teacher before continuing. Excess raw fuel collects in the manifolds and crankcase and may cause explosions that will blow oil filler caps, breather caps, etc. into one's face.
11. If any engine does not sound right during cranking or while running, turn off the ignition and notify the teacher.
12. Remove the ignition key or disconnect the battery ground cable while working on or around fan belts, pulleys, etc.
13. Provide adequate ventilation when running an engine in the shop. Always attach the shop exhaust pickup hoses and turn on the fan.
14. No one is permitted under the automobile while the engine is running.
15. Do not stand in line with the fan during starting and acceleration.
16. Prime the engine with the gasoline primer only. Always have a fire extinguisher handy.
17. Keep all oily, solvent, or gasoline-soaked rags in the proper container.
18. Learn the location and proper use of the shop fire extinguishers.
19. Gasoline shall be kept in an approved container.
20. The shop area is to be kept neat at all times. Cluttered or dirty shops are good sites for accidents.
21. Light is essential for good work. It is also essential for safe work. Use drop lights whenever work cannot be seen clearly.
22. Long sleeves are to be kept buttoned or rolled up, shirt tails must be tucked in, and long ties and jewelry will be removed. Aprons shall be snugly secured.
23. No one is to work overtime in the shop without the teacher's permission.

24. No pupils, other than those enrolled in the course at that hour, will be allowed to remain in the shop without the teacher's permission.
25. Safety glasses or goggles must be worn when the pupil is in the shop work area, whether he/she is actually working or not.
26. Guard against an automatic response. Touching a spark plug or high tension leak may cause one to jerk away and into the fan.
27. When one person is working above the engine, and another below, the former must be careful to avoid dropping parts or tools from above.
28. Wait for hot radiators to cool before removing the caps.
29. The automotive creeper can be used to lie on only while working beneath the vehicle. Do not stand on or play on the creeper. Stand it up when it is not in use.
30. No fuel tanks will be dismantled or repaired in the school shop program.
31. If a fuel tank leaks the vehicle is to be immediately rolled outside of the building without starting the engine. Syphon the residual amount of fuel in the tank to approved storage containers.



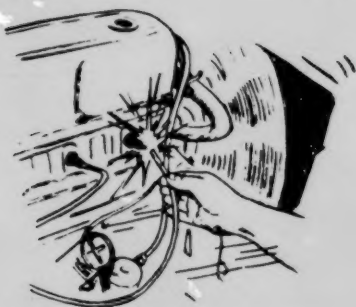
DIRECT THE EXHAUST
OUTSIDE.

A CLEAN SHOP IS A
SAFER SHOP.



ALWAYS WORK WITH CARE.

303



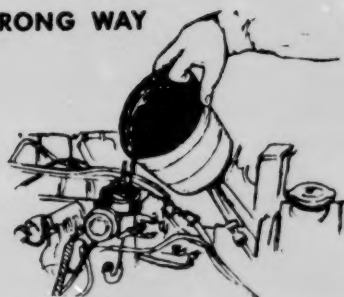
GUARD AGAINST AUTOMATIC RESPONSE.

AUTOMATIC RESPONSE

USE THE PRIMER CAN WHEN START-
ING THE ENGINE.



WRONG WAY



WAIT FOR HOT RADIATORS TO COOL BEFORE
REMOVING CAPS.



IT IS UNSAFE TO STAND ON OR PLAY ON THE CREEPER.

AUTO MECHANICS GENERAL SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

- _____ 1. Pupils working in the shop will wear clothes that do not hang too loosely about the body. Sleeves must be rolled up or buttoned at the cuff. The shirt tail must be tucked in and, except in rare cases, no gloves should be worn because:
- A. loose clothing is a safety hazard.
 - B. all pupils are required to dress alike.
 - C. shop pupils are required to dress differently than other pupils.
 - D. it looks better.
- _____ 2. Materials shall not be left on the floor because:
- A. they may be carried out by the person who cleans the shop.
 - B. they need to be placed where other pupils can find them when they are needed.
 - C. they present a safety hazard to those who must move about the shop while working.
 - D. it is too costly to replace unused materials.
- _____ 3. In all shop work, the most important consideration for the pupil shall be:
- A. speed of production.
 - B. accuracy in his/her work.
 - C. safety for himself/herself and others.
- _____ 4. Pupils will be allowed in the cars in the shop:
- A. when they are tired and need a rest.
 - B. only when the job requires it.
 - C. during breaks.
- _____ 5. Pupils from other classes are allowed in the shop:
- A. during lunch or after school.
 - B. when the shop pupils invite them.
 - C. only with the teacher's permission.

- _____ 6. The automotive creeper will be used to:
- A. stand on.
 - B. lie on while working under a vehicle.
 - C. move things.
- _____ 7. Hot exhaust pipes and manifolds, hot radiators, and drop lights will:
- A. scare the person touching them.
 - B. break when they are touched.
 - C. burn deeply when they are touched.
- _____ 8. Touching a moving belt or pulley may:
- A. cut off a finger or hand.
 - B. get the belt out of adjustment.
 - C. get grease on the hand.
- _____ 9. Vehicles will be driven or moved by:
- A. those pupils that are working on them.
 - B. authorized personnel with the teacher's permission.
 - C. anyone that is not busy at the time.
- _____ 10. Removing a radiator cap from a hot radiator could:
- A. cause a loss of all the antifreeze.
 - B. cause a loss of the pressure.
 - C. seriously burn the worker.
- _____ 11. Before starting an engine that has been repaired in the shop:
- A. turn it over three times by hand.
 - B. ask the teacher to inspect and approve it.
 - C. start it slowly.
- _____ 12. Engines in operation in the shop should be provided with a flexible tube to run the exhaust gases to the outside in order to prevent:
- A. discoloring of the walls and ceiling of the shop.
 - B. anyone from being overcome by carbon monoxide.
 - C. the starting of a fire.
 - D. the heat from building up in the shop.

- _____ 13. Disconnect the battery when working on automobiles that do not require engine operation to prevent:
- A. the discharging of the battery.
 - B. the undue wear of parts caused by operating the starter unintentionally.
 - C. the unintentional cranking of the engine and the causing of a serious injury due to a pupil working on those parts that might be set in motion.
- _____ 14. If oil or grease is spilled on the floor:
- A. clean it up immediately.
 - B. walk around it to prevent a fall.
 - C. clean it up at the end of each period and hope no one steps in it.
 - D. leave it for the custodian.
- _____ 15. When working on an engine that is running, one should:
- A. remove the blocks from the wheels.
 - B. make sure the gas tank is full.
 - C. keep the car in low gear.
 - D. keep the head and hands away from the revolving fan or moving pulleys.
- _____ 16. The automotive shop should be kept clean because:
- A. a clean shop is a safe shop.
 - B. the teacher says it must be done.
 - C. the rule book says it looks better.
 - D. of harmful germs.
- _____ 17. A pupil can work in the shop only when:
- A. it is Friday.
 - B. the teacher is present.
 - C. he feels like it.
 - D. it is convenient.
- _____ 18. Before starting a newly overhauled engine, obtain permission from the teacher and:
- A. remove the oil dipstick.
 - B. recheck the spark plug wiring order.
 - C. make sure all persons and tools are clear of turning parts.
 - D. do all of the above.

- _____ 19. When trying to start an engine, one should never:
- A. look into the top of the carburetor.
 - B. choke the carburetor with the bare hand.
 - C. use an open gasoline can to prime the carburetor.
 - D. do any of the above.
- _____ 20. While the engine is running:
- A. only one person is permitted under the car.
 - B. only one person is under the car and one is in the car.
 - C. no one is to be under the car.
 - D. no more than two persons are permitted under the car.
- _____ 21. Fan blades have been known to break off, therefore:
- A. be ready to dodge.
 - B. never stand in line with the turning fan during acceleration and high engine speed tests.
 - C. check before starting the engine and disconnect the fan belt.
 - D. always close the car hood.
- _____ 22. Gasoline should be kept in:
- A. an open container.
 - B. a container approved by OSHA.
 - C. a glass container.
 - D. a plastic container.
- _____ 23. When starting a newly overhauled engine, one should:
- A. rev it up to check it out.
 - B. jack at least one rear wheel off the floor in case the transmission is in gear.
 - C. choke the carburetor with the bare hand.
 - D. adjust the belt tension.
- _____ 24. In order to properly check the fluid level in the radiator on a hot engine, one must:
- A. release the radiator cap slowly.
 - B. release the radiator cap quickly and step back.
 - C. get someone else to release the radiator cap.
 - D. wait for the engine to cool before slowly releasing the radiator cap.

_____ 25. Pupils must wear safety glasses:

- A. when in the shop work area.
- B. only when grinding valves.
- C. only when the teacher is watching.
- D. when they are comfortable.

Auto Mechanics General Safety Quiz Key

1. A	6. B	11. B	16. A	21. B
2. C	7. C	12. B	17. B	22. B
3. C	8. A	13. C	18. C	23. B
4. B	9. B	14. A	19. D	24. D
5. C	10. C	15. D	20. C	25. A

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Materials were selected and reviewed from the following sources, and in some instances were incorporated in the production of the preceding unit.

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Ammco Tools, Inc.

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CM Chain Co., "Chain Safety"

U. S. Dept. of Labor, "General Industry Safety and Health Standards",
OSHA #2206

Hawaii State Dept. of Education, "Instructional Guide for Auto Mechanics"
and "Industrial Education Safety Instructional Guide"

Kansas State Safety Guide, "Safety Practices in the Auto, Diesel, and
Agriculture Mechanics Shops." by Janice Parr, Kansas Curriculum
Materials Dissemination Center, Pittsburg State University

National Institute for Occupational Safety and Health, NIOS, "Health
and Safety Guide". U.S. Dept. of Health, Education, and Welfare.

Ohio State Safety Guide , "Industrial Arts and Vocational Education
Safety"

Oklahoma State Safety Guide, "Accident Prevention for Industrial Arts,
Vocational and Technical Education Programs", Oklahoma State Board
of Vocational and Technical Education

Shawnee Mission Public Schools Safety Guide, "Safety Guide"

Utah State Safety Guide, "Industrial Education Safety Recommendations
and OSHA Standards"

Washington State Industrial Arts Safety Guide

Wyoming State Safety Guide, "Occupational Education Safety Manual"

ELECTRICITY AND ELECTRONICS

LABORATORY/CLASSROOM REQUIREMENTS

1. Illumination should be in the order of 100 foot candles in both the laboratory and class work areas.
2. Additional illumination should be supplied by using flexible magnifier lamps for precision work.
3. Laboratory bench tops and floor should be covered with nonconductive material.
4. The laboratory benches should be wired with line voltage regulated electricity.
5. Benches should supply variable AC and DC voltage with an isolation transformer and ground fault protection.
6. All duplex convenience outlets should have three-wire installation and all other installations shall comply with the provisions of OSHA.
7. Fuses and circuit breakers shall be located (or shielded) so persons will not be burned or otherwise injured by their operation. (OSHA)
8. Dry chemical or carbon dioxide fire extinguishers are the only types to be used on Class C or electrical fires. (OSHA)
9. All equipment connected by cords and plugs which may become energized shall be grounded. (OSHA)

GENERAL SAFETY RULES

1. Playing, scuffling, or any other form of horseplay is not permitted in the laboratory.
2. One should never throw or toss anything, at any time.
3. A person should acquire a habit of caution, not only for his/her own safety, but also for the safety of others.
4. All accidents, no matter how slight, should be reported to the teacher.

5. One should obtain first aid for any injury, no matter how slight the injury is.
6. Another person should always be present when the pupil is conducting tests on potentially hazardous equipment.
7. Only dry chemical or carbon dioxide fire extinguishers shall be used on electrical fires.
8. Properly fitted clothing should be worn. Loose clothing can catch on objects and cause accidents.
9. Pants without cuffs should be worn.
10. Metal jewelry (bracelets, rings, chains, etc.) should not be worn when working on any type of electrical equipment.
11. The area where one is working should always be clear and clean.
12. A person must never work on a damp floor.
13. All files must be fitted with handles.
14. All tools must be in good condition and must have properly insulated handles.
15. One should never throw a switch on a piece of equipment just to see what happens.
16. Capacitors must be discharged before they are touched.
17. Electrical equipment with an adequately grounded frame or case shall be used. (OSHA)
18. Any defective equipment (such as worn cords or broken plugs) are to be reported immediately.
19. It is unwise to remove a plug from an outlet or jack by pulling on the cord.
20. All electric wires should be considered "live" until they have been checked.
21. Extension cords shall be protected from damage caused by closing doors, sharp corners, projections, or traffic. (OSHA)
22. All extension cords must be of the three-wire type. (OSHA)
23. Extension cords may not be used as a substitute for fixed wiring. (OSHA)

24. A pupil must not open or close a circuit breaker without the teacher's permission.
25. The power must be turned off before connection changes are made.
26. One's hands must be dry before working with electrical equipment.
27. No equipment shall be operated without the teacher's approval.
28. No one shall operate electrical equipment unless he/she has had instructions on how to use it.
29. One must never use both hands to make an adjustment on an active circuit. Use only one hand. Place the other hand behind the back or in a pocket. A current between two hands goes through the heart area and can be fatal. A current from hand to ground, through the foot, is not likely to be fatal.
30. A pupil should ask the teacher for specific directions if he/she is in doubt about any connection.
31. No electrical equipment is to be operated if the teacher is called from the laboratory.
32. A person should cut away from the body as if he/she were sharpening a pencil, when removing insulation from a wire with a knife.
33. No paste or liquid flux should be used on electrical circuits.
34. One should not try to "shock" other pupils. They may have a weak heart or some other physical disability.
35. Every circuit must be fused.
36. Fuses shall be replaced only after the power has been turned off.
37. It is important to correct the cause of a blown fuse or tripped circuit breaker before replacing the fuse or resetting the breaker.
38. One must wear safety glasses or goggles when using a soldering iron.
39. Soldering iron cords must be kept away from the hot end. Never "flip" solder when desoldering.

ELECTRICITY AND ELECTRONICS SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

- _____ 1. When a person is working on electrical equipment, he/she should not wear:
- A. loose clothing.
 - B. metal jewelry.
 - C. pants with cuffs.
 - D. all of the above.
- _____ 2. All files should be:
- A. new.
 - B. oiled and clean.
 - C. fitted with handles.
 - D. both B and C.
- _____ 3. Until they have been checked, all electric wires should be considered:
- A. insulated.
 - B. live.
 - C. completed.
 - D. all of the above.
- _____ 4. Any injury should be reported immediately to:
- A. the principal.
 - B. the shop foreman.
 - C. the teacher.
 - D. both A and C.
- _____ 5. Safety in the laboratory includes:
- A. not shocking other pupils.
 - B. no playing or scuffling.
 - C. not throwing or tossing anything.
 - D. all of the above.

- _____ 6. The work area should be:
- A. clean and clear.
 - B. insulated with plastic.
 - C. dry.
 - D. both A and C.
- _____ 7. Before operating any electrical equipment, be sure that:
- A. the hands are dry.
 - B. it has no broken plugs or worn cords.
 - C. it has an adequate grounded frame or case.
 - D. all of the above are true.
- _____ 8. If a person is working on an AC-DC project or a circuit board, the first thing he/she should do is:
- A. to make sure the capacitor is discharged.
 - B. to wipe off the equipment.
 - C. to sharpen all tools.
 - D. to turn on the switch.
- _____ 9. Do not use tools that:
- A. are sharp.
 - B. do not have properly insulated handles.
 - C. are not in the tool cabinet.
 - D. are both A and B.
- _____ 10. All extension cords should:
- A. be at least 25 feet long.
 - B. have rubber insulation.
 - C. be of the three-wire type.
 - D. be both A and C.
- _____ 11. Before making connection changes on a circuit board, one should:
- A. make sure the power is turned off.
 - B. make sure he/she knows what to do.
 - C. make sure the power is turned on.
 - D. do both A and B.
- _____ 12. When making connection changes on an active circuit board, one should:
- A. always use both hands.
 - B. never use insulated tools.
 - C. never use both hands.
 - D. do both A and B.

____ 13. All active circuits and electrical equipment must have:

- A. a fuse.
- B. an insulator.
- C. a cork.
- D. a capacitor.

____ 14. While soldering, be sure:

- A. to keep cords away from the hot end.
- B. to wear safety glasses or goggles.
- C. to avoid flipping solder off the iron.
- D. to do all of the above.

____ 15. To safely remove insulation from a wire:

- A. use a pair of pliers.
- B. use a knife and cut away from the body.
- C. use a match to burn it away.
- D. do none of the above.

____ 16. To put out an electrical fire, one should always use an extinguisher containing:

- A. dry chemical and/or carbon dioxide.
- B. soda acid and foam.
- C. pressurized water and foam.
- D. dry chemical and water.

____ 17. Extension cords should not be:

- A. the three-wire type.
- B. used as a substitute for fixed wiring.
- C. placed where they can be damaged.
- D. both B and C.

SAFETY QUIZ KEY

- | | |
|------|-------|
| 1. D | 10. C |
| 2. C | 11. D |
| 3. B | 12. C |
| 4. C | 13. A |
| 5. D | 14. D |
| 6. D | 15. B |
| 7. D | 16. A |
| 8. A | 17. D |
| 9. B | |

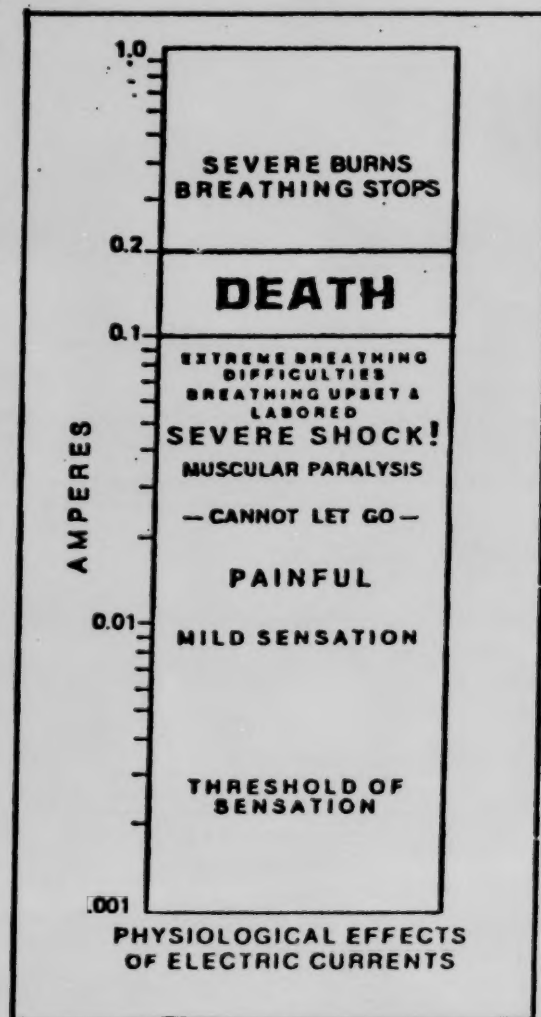
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ELECTRONIC CURRENTS AND CIRCUITS

(Graymark International, Inc.)

With electricity, the technician must exercise safety precautions to prevent current from passing through his/her body. A very small amount of electric current passing through the body can cause injury and even death. The illustration below shows what can occur when different amounts of current pass through the body. A current as small as .1 amp can cause death. Equally important, even lesser amounts of current can cause physiological effects, ranging from a small sensation to extreme breathing difficulties.

These effects can also cause more dangerous events. For example, receiving a mild sensation of only .01 amp would come as a surprise; the person's reaction to it may cause him/her serious injury. A violent involuntary muscle spasm could cause the electrician to come in contact with an even higher voltage, which could hurl his/her body against a sharp projection, workbench, or wall. This is no cause for alarm, the worker must learn and practice safety precautions for electricity.



UNDERSTANDING THE ELECTRICAL RESISTANCE OF THE BODY

Current is forced through the resistance of a circuit by voltage, which is electrical pressure or force. A lower resistance in the circuit allows more current to pass through the circuit for a given amount of voltage. If the human body is thought of as a circuit, then the amount of current that can flow between any two points of the body depends on the resistance between those two points at that time and the amount of voltage or electrical pressure applied. Normally, skin resistance is high. This high resistance tends to impede the current flowing into and out of the body. However, there are several conditions which can lower skin resistance drastically and which permit a larger amount of current to pass through the body with the same voltage applied.

The average body resistance is over 100,000 ohms. However, if the skin is wet from perspiration or other moisture, or if the pulse rate is high, the body's resistance can be as low as a few hundred ohms. Also, if the skin is broken with a cut or an abrasion, a lesser voltage is required at that point to force the same amount of current through the body.

PRECAUTIONS TO BE USED WHEN WORKING WITH ELECTRONIC CIRCUITS

1. Practice a precaution used by experienced technicians. Try to keep one hand in your pocket or behind you, when you are making voltage and current measurements. If two hands are in contact with the circuit, or if one hand is in contact with the circuit and the other hand is in contact with ground (such as a metal panel or the case of a piece of test equipment), the current path is across the chest where the heart and lungs are located. **THIS IS EXTREMELY DANGEROUS.**
2. Do not work on electronic circuits when the power is on, except when absolutely necessary.
3. Electrolytic and other large capacitors can hold a voltage charge for several hours after the power is removed. Make it a habit to check if they are fully discharged by shorting them with a screwdriver with an insulated handle or clip lead before working on a circuit.
4. Do not work on electronic equipment while standing on a damp floor or when leaning on any metal object.
5. Certain components, such as resistors and vacuum tubes, get quite hot. Give them time to cool off before removing them.
6. Know the location of and how to use an available fire extinguisher.
7. Be sure equipment is in proper working order before using it.

HOUSE AND BUILDING WIRING

1. Properly fitted clothing is essential for safety. Loose clothing can catch on objects and cause accidents.
2. Long shirt sleeves should be buttoned at all times.
3. Work pants without cuffs should be worn.
4. Canvas shoes should not be worn on the job.
5. Gloves protect the hands and should be worn when doing rough work.
6. Rings, I.D. bracelets, wristwatches with metal bands, other metal jewelry, etc. are conductive and could cause a serious shock if they make contact with electricity.
7. Pupils who have long hair should wear safety caps or hair nets completely covering their hair.
8. Pupils working in areas where there is a possibility of head injury from impact, falling or flying objects, or electrical shock and burns, shall be protected by protective helmets. (OSHA)
9. Metal helmets shall not be worn.
10. Goggles or glasses with side shields should be worn.
11. Pupils working in elevated positions shall use a safety belt or other adequate means to guard against falling.
12. The handles of an electrician's pliers should be insulated.
13. Pupils shall wear electrician's gloves when doing "hot" work.
14. Portable metal ladders shall not be used for electrical work or where they may contact electrical conductors. (OSHA)
15. Electrical shock victims must not be touched if they are still in contact with the power line.
16. Electrical burns must be kept clean.

17. Quilted nylon-shell, polyester-filled clothing will burn and melt to form a hot plastic mass which adheres to the skin and can cause serious burns. Such clothing should be worn only underneath other clothing and should not be exposed to open flames or sparks.
18. All electrical work (both temporary and permanent), installations, and wire capacities shall be in accordance with recognized standards. (OSHA)
19. Equipment or circuits that are de-energized shall be rendered inoperative and have tags attached at all points where such equipment or circuits can be energized.
20. On all energized circuits of 400 volts or more, two or more pupils must work together.
21. Exposed bulbs on temporary lights should be guarded.
22. Head protection, eye protection (safety glasses or goggles with ultraviolet absorbing lenses), and rubber insulating gloves shall be worn when working on energized circuits.
23. Rubber matting should be used on energized circuits, where necessary.
24. Each disconnecting means, service feeder, or branch circuit should be legibly marked at the point where it originates in order to indicate its purpose.

HOUSE AND BUILDING WIRING SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

Read each statement carefully and record the best choice.

_____ 1. When wiring a house or building:

- A. never wear canvas shoes.
- B. never wear shirts with long sleeves.
- C. never wear metal helmets.
- D. never wear both A and C.

_____ 2. Gloves should be worn when working with:

- A. hot circuits.
- B. de-energized circuits.
- C. water.
- D. both A and B.

_____ 3. When working on electrical wiring:

- A. never wear pants without cuffs.
- B. never wear leather gloves.
- C. never use portable metal ladders.
- D. observe both A and C.

_____ 4. If one is doing wiring, it is dangerous to wear:

- A. loose fitting clothing.
- B. jewelry.
- C. nylon-shell or polyester-filled clothing.
- D. all of the above.

_____ 5. All electrical work (both temporary and permanent installations) and wire capacities shall:

- A. be done by two pupils working together.
- B. be in accordance with recognized standards.
- C. be inspected every day.
- D. be both A and B.

- _____ 6. When working on energized electrical circuits:
- A. always work alone.
 - B. use rubber matting where necessary.
 - C. guard all temporary lights with exposed bulbs.
 - D. do both B and C.
- _____ 7. Head and eye protection and rubber insulating gloves shall be worn when:
- A. working on energized circuits.
 - B. working in an elevated position.
 - C. working on portable metal ladders.
 - D. doing all of the above.
- _____ 8. Pupils shall be protected by protective helmets when there is:
- A. a possibility of electrical shock.
 - B. a possibility of head injury by impact.
 - C. a possibility of falling objects.
 - D. all of the above.
- _____ 9. Pupils working in elevated positions shall:
- A. wear rubber insulating gloves.
 - B. use safety belts.
 - C. wear rubber-soled canvas shoes.
 - D. do both A and B.
- _____ 10. Equipment or circuits that are de-energized shall be rendered inoperative and must also:
- A. be insulated.
 - B. be removed from the structure.
 - C. have tags attached where they can be energized.
 - D. be none of the above.

Key

- | | |
|------|-------|
| 1. D | 6. D |
| 2. A | 7. A |
| 3. C | 8. D |
| 4. D | 9. B |
| 5. B | 10. C |

GRAPHIC ARTS

Accident prevention is up to each individual. There are certain basic rules of safe behavior that a person should make a part of his/her daily routine. These rules involve attitudes toward fellow workers as well as attitudes toward the task at hand. People with poor job attitudes are those who most frequently have accidents.

ORDERLINESS

1. A safe worker has a methodical approach to each job.
2. Tools should be laid out neatly so one can approach the project in an orderly manner.
3. The work area should not be cluttered with excessive tools and materials.
4. Tools and equipment should be cleaned and replaced in their proper storage area when a job is finished.

CLEANLINESS

1. Floors should be kept uncluttered to prevent accidents, especially in dimlight areas such as the darkroom.
2. Paper should not be allowed to collect on the floor around and underneath any equipment.
3. Spills should be cleaned up immediately to keep someone from slipping and falling.
4. Messy jobs require a continual cleanup of the work area and frequently a cleaning of the worker, too.

HORSEPLAY

1. Horseplay in the laboratory will not be tolerated.

2. Joking around machinery, tossing an item to another person, splashing water, etc. could cause an accident leading to serious injury.
3. One should not run in the laboratory, direct compressed air toward another, or disregard the accepted safe practices of laboratory environment.

CLOTHING AND PERSONAL PROTECTION

1. A lab coat or apron shall be worn in the lab at all times.
2. Loose clothing and ties should be avoided.
3. Rings and other jewelry are to be removed when working in the laboratory.
4. Long hair must be kept tied back to prevent its being caught in moving machine parts.
5. Ear protection should be used where noise levels are excessive over long periods of time, such as in the bindery and the pressroom.
6. Protective gloves shall be worn when working with hot metal.
7. Safety glasses or face shields must be used when working with cut-off saws, hot metals, and photographic chemicals.
8. Direct viewing of the bright lights used in photography and plate-making should be avoided. This is especially true of those lights which have a large amount of ultraviolet light. Observing this rule is very important to people who wear contact lenses. Failure to do so could cause eye damage.
9. Help is needed when moving heavy objects. Before lifting, make it clear as to who is giving the directions. Use the proper lifting techniques; bending at the knees instead of at the waist, keeping the back straight, etc.
10. One should know his/her physical limitations and not attempt to do something beyond one's ability.
11. All injuries, no matter how small, should be reported to the teacher immediately.

FIRE PREVENTION

1. Know how to use the fire extinguishers in the lab and remember where they are located.
2. Absolutely no smoking is allowed in the Graphic Arts lab.
3. Report all frayed electrical cords, bare wires, or electrical shocks to the teacher.
4. Any breakage or malfunctions of tools or equipment should also be reported to the teacher.
5. All solvents and volatile liquids shall be kept in safety cans and stored away from the classroom.
6. Gasoline must never be used as a cleaning fluid or solvent.
7. Oily or solvent-soaked rags must be put in the proper metal container and never thrown in wastebaskets.

CHEMICALS

1. Chemicals shall be kept properly labeled and used only as directed.
2. A lab apron and approved safety glasses or goggles shall be worn whenever one is mixing or pouring chemicals or inks.
3. Solutions should be mixed at arm's length, never near the face and eyes.
4. Hands are to be kept away from the eyes and mouth. Never eat while working.
5. Hands should be washed thoroughly with soap and water after handling chemicals.
6. The ventilating fan must be turned on when one is using the darkroom and the platemaking areas.

MACHINERY

1. No machine shall be used until the user has been instructed in its proper operation.
2. No power equipment or cutting device shall be operated without the teacher's permission or when the teacher is not in the room.

3. All presses shall be operated at a speed that keeps the operator in full control of the situation at all times.
4. Beginning pupils should use the slowest speed when operating the presses.
5. All cutting edges should be kept sharp and all guards should be in place before operating.
6. Safety control devices or guards must be disconnected or by-passed.
7. A person must never reach into a moving piece of equipment for any reason whatsoever.
8. A machine is to be completely stopped before attempting to clear jams, adjust, repair, or clean it.
9. Only one pupil at a time should operate any machine.
10. Anyone operating power machinery should not be distracted (this prohibits conversation with them).
11. There should never be more pupils at a work station than that station can safely handle.
12. Tools should be used only for those purposes for which each one was designed.
13. Tools should be cleaned and returned to their places when one is finished with them.

GRAPHIC ARTS GENERAL SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

Multiple Choice

- _____ 1. Pupils are allowed to run in the shop: (a) when in a hurry, (b) never, (c) at the end of class, (d) during a fire drill.
- _____ 2. No watches, rings, or jewelry are to be worn in the shop because: (a) the teacher forbids it, (b) they may be caught in a machine or shorted electrically, causing severe injury to the pupil, (c) they may get dirty, (d) they might get lost.
- _____ 3. Materials should not be left on the floor because: (a) they may be thrown away by the custodian, (b) they present a safety hazard, (c) it is easier to replace unused materials, (d) they may get dirty.
- _____ 4. Keeping the shop floor in safe working condition is the responsibility of: (a) the custodian, (b) the teacher, (c) the teacher and pupils, (d) all of these.
- _____ 5. Remove a guard from a machine: (a) when necessary to get large stock on, (b) never, (c) only while being careful, (d) when the teacher is out of the room.
- _____ 6. Turning on a switch for another person may: (a) cause serious injury to the other person, (b) be a big help, (c) blow a fuse, (d) be a good thing to do.
- _____ 7. Overloaded electrical circuits may cause: (a) a blown fuse or a fire, (b) a bent wire, (c) a shock, (d) a defective circuit breaker.
- _____ 8. Frayed or defective extension or power cords could cause: (a) possible serious injury from shock or burns, (b) dim lights, (c) no serious damage, (d) equipment to stop running.
- _____ 9. Solvent, rather than gasoline, should be used for cleaning because: (a) it cleans better, (b) it evaporates faster, (c) it will not catch fire as easily, (d) it is cheaper to buy.

- ____ 10. Flammable liquids should be kept and stored in a metal safety can to: (a) prevent evaporation, (b) reduce the fire hazard, (c) keep them out of the way, (d) make them easy to find.
- ____ 11. Smoking is allowed in the shop: (a) before and after class, (b) during breaks, (c) during lunch hour, (d) never.
- ____ 12. Oily waste and rags should always be: (a) placed in the waste-basket, (b) rolled in a tight bundle, (c) placed in a metal, self-closing can, (d) left out for the next person to use.
- ____ 13. Scraps and other trash: (a) should be left on the floor and removed at the end of class, (b) should be placed in the waste-basket, (c) can be disregarded as they do not cause a safety hazard, (d) should be left for the custodian to pick up.
- ____ 14. Pupils should be especially alert to danger from accidents when: (a) using unfamiliar tools or equipment, (b) trying to hurry to complete a project, (c) the teacher is out of the room, (d) all of these are taking place.
- ____ 15. If ink, oil, or other liquids are spilled on the floor, one should: (a) clean it up immediately, (b) walk around it carefully so as not to fall, (c) clean it up at the end of class, (d) leave it for the custodian.
- ____ 16. When using inks, solvents, or chemicals, be sure to: (a) keep the hands away from the eyes and mouth, (b) wash the hands thoroughly when finished, (c) not eat while working, (d) do all of these.
- ____ 17. The operating speed of all presses should be decided by the: (a) rate of the previous operator, (b) ability of the present operator, (c) amount of work to be done, (d) amount of time needed to do the work.
- ____ 18. Identify the contents of bottles by: (a) taste, (b) smell, (c) reading the label, (d) asking another pupil.
- ____ 19. Always keep the work area: (a) cluttered, (b) neat, (c) dirty, (d) none of these.
- ____ 20. Tools should always be: (a) left on benches, (b) left on machines, (c) put away when not in use, (d) none of these.
- ____ 21. On any job, always use: (a) the tool which is handy, (b) the right tool for the job, (c) whatever everyone else uses, (d) whatever one wants.
- ____ 22. Tools should be kept: (a) where they belong, (b) clean, (c) in safe working condition, (d) all of these.

- _____ 23. Dull, broken, or worn-out tools or equipment should be:
(a) used, (b) thrown away, (c) reported to the teacher,
(d) reported to other pupils.
- _____ 24. Cutting tools should never be: (a) dull, (b) carried in the
pocket, (c) left lying around the work area, (d) all of these.
- _____ 25. Operate a given machine only when: (a) the teacher is out of
the room, (b) told to do so by the teacher, (c) after watching
other pupils do it, (d) any time one needs to.
- _____ 26. If a person does not thoroughly understand an operation, he/she
should: (a) ask another pupil for help, (b) go ahead anyway,
(c) ask the teacher for help, (d) do nothing.
- _____ 27. Before starting a machine, one should make sure: (a) the
teacher is out of the room, (b) the motor is oiled, (c) all
the safety guards are operative and in place, (d) all of these.
- _____ 28. Never leave a machine until: (a) the switch is turned off,
(b) it has completely stopped running, (c) it has been cleaned,
(d) all of these.
- _____ 29. When cleaning, oiling, adjusting, or repairing a machine, one
should always: (a) make sure it is completely stopped,
(b) make sure the power switch is locked in an "off" position,
(c) replace any guards immediately after finishing, (d) all
of these.
- _____ 30. Wear proper goggles, aprons, and other protective devices:
(a) only when the teacher is in the room, (b) on any jobs
which require them, (c) only when made to do so, (d) only
when others are watching.
- _____ 31. Before operating any machine: (a) tuck in loose clothing,
(b) roll up long sleeves, (c) remove jewelry, (d) do all of
these.
- _____ 32. Distracting a fellow worker's attention for a moment: (a) can
cause an accident, (b) is permissible when the teacher is out
of the room, (c) is permissible when the teacher is in the
room, (d) keeps him alert.
- _____ 33. All cuts, scratches, burns or puncture wounds: (a) can become
infected, (b) should be reported, (c) should be treated
immediately, (d) all of these.
- _____ 34. If an object is too heavy or awkward to lift: (a) get some
help, (b) show independence by lifting it alone, (c) take a
chance that it won't be dropped, (d) leave it to do later.

- ____ 35. All fire hazards should be: (a) reported to the teacher (b) ignored, (c) reported to other pupils, (d) reported to the principal.
- ____ 36. Injuries often happen to people who: (a) take chances, (b) ignore safety rules, (c) commit unsafe acts, (d) do all of these.
- ____ 37. The main reason for keeping materials, tools, and scraps off the floor is: (a) it looks sloppy, (b) they might get damaged, (c) they are a safety hazard, (d) they may get dirty.
- ____ 38. It is necessary to get the teacher's permission to operate power equipment because: (a) the teacher wants only certain pupils to operate the machines, (b) it may not be the proper machine to use, (c) pupils should never try to operate a machine unless they have had instructions on how to operate it, (d) the machine might need to be checked and oiled.
- ____ 39. Accidents can be: (a) increased, (b) decreased, (c) prevented, (d) all of these.
- ____ 40. All injuries should be reported to the teacher: (a) so that he/she can fill out an accident report, (b) so the hazard can be eliminated, (c) in order to get first aid if necessary, (d) all of these.
- ____ 41. Throwing type is prohibited because: (a) there is danger of injury to the eyes of pupils, (b) the teacher may be hit, (c) the type thrown away may be the piece needed later, (d) there is danger of breaking lights or windows.
- ____ 42. Before starting a machine, one should first: (a) know how to operate it, (b) place all the guards in position, (c) have the teacher's permission, (d) all of these.
- ____ 43. Combustible materials such as solvents, type cleaners, rubber cement, etc. should be: (a) stored in fireproof containers, (b) used only in well-ventilated areas, (c) kept away from fire and sparks, (d) all of these.
- ____ 44. If a pupil is not sure about the operation of a certain piece of equipment, he/she should: (a) read about it in the text-book, (b) be checked out on it by the teacher, (c) ask another pupil to help, (d) learn to run it by watching others.

- _____ 45. A pupil should not meddle with machinery which does not concern him/her because: (a) the machinery might be damaged, (b) someone's work in the machine might be damaged, (c) he/she might cause injury to someone, (d) it might cause trouble for the one meddling.
- _____ 46. Before using a machine, a pupil must: (a) pass a safety test on that machine, (b) get permission from the teacher, (c) check the machine for proper operating conditions, (d) all of these.
- _____ 47. "Horseplay" in the classroom: (a) is forbidden at all times, (b) must be confined until after clean-up, (c) should be limited to harmless practical jokes, (d) is all right if work is not hampered.
- _____ 48. Those pupils allowed in danger zones when machines are in operation are: (a) class members only, (b) the machine operator plus a helper, (c) the machine operator, a helper, and one pupil observer, (d) the machine operator only.
- _____ 49. Improper dress and hair grooming are most hazardous because: (a) the pupil may be teased by friends, (b) hair or clothing could get caught in a machine, (c) it will irritate the teacher, (d) time is lost getting it corrected.
- _____ 50. To lift a heavy object: (a) use arm and back muscles, (b) bend at the knees, (c) use back muscles only, (d) bend at the waist.
- _____ 51. Someone other than the operator may turn on a machine: (a) with the teacher's permission, (b) when he/she sees the operator needs help, (c) when asked by the operator, (d) never.
- _____ 52. Talking to a machine operator is permissible: (a) only when discussing a problem, (b) when the teacher is in the room, (c) if absolutely necessary, (d) never.
- _____ 53. If a safety hazard exists in the shop: (a) file a hazard report, (b) tell other students, (c) tell the teacher immediately, (d) be extra careful.
- _____ 54. Handle paper carefully because: (a) the surface may be glossy, (b) edges can cut the skin, (c) the paper may roll, (d) paper gets dirty easily.
- _____ 55. When mixing chemicals: (a) avoid skin contact, (b) wear safety glasses, (c) avoid inhaling fumes, (d) do all of these.

GENERAL GRAPHIC ARTS SAFETY QUIZ KEY

1. B	21. B	41. A
2. B	22. D	42. D
3. B	23. C	43. D
4. D	24. D	44. B
5. B	25. B	45. C
6. A	26. C	46. D
7. A	27. C	47. A
8. A	28. D	48. D
9. C	29. D	49. B
10. B	30. B	50. B
11. D	31. D	51. D
12. C	32. A	52. D
13. B	33. D	53. C
14. D	34. A	54. B
15. A	35. A	55. D
16. D	36. D	
17. B	37. C	
18. C	38. C	
19. B	39. C	
20. C	40. D	

PHOTOGRAPHY

1. Do not use any machine or equipment until the necessary safety instruction has been received.
2. Do not use any machine or equipment before, during, or after class hours unless permission has been received and there is a teacher in charge.
3. If engaged in any activity where eye hazards such as flying particles, corrosive substances, or corrosive chemicals are present, suitable eye protection (goggles or face shields) must be used.
4. Become thoroughly familiar with all fire signals, fire drill procedures, and fire exits. In case of a fire alarm, walk quietly to the nearest exit and proceed through it to safety.
5. Wipe up all chemicals or water spilled on the floor in order to prevent serious injuries to someone. This should be done immediately to eliminate any slipping and falling.
6. Do not engage in playing, clowning, and running. Playing and scuffling, sometimes referred to as "horseplay," can be extremely dangerous. A playful push may cause a collision with the sharp edge of a bench or the corner of a machine or other object.
7. Caution violators to stop unsafe activities. Call the teacher's attention to any violation of safety rules or good safety practices. Do not consider this as "snitching" since it may prevent serious injuries from happening. Report any unsafe equipment or condition to the teacher.
8. Inform the teacher of any accident, however slight. Infection may result from cuts and scratches that are left unattended.
9. Remember that bare feet will not be permitted in the building or laboratory at any time.
10. Do not drink any water from the taps within the lab area.
11. Smoking or any open flame is prohibited, due to the volatile substances involved in photography and the possible damage to equipment (lenses, etc.).

12. Be sure to wash the hands thoroughly with soap and water before eating, drinking, or smoking after leaving the laboratory.
13. Consult the teacher, not another pupil, if in doubt about the use of any piece of photographic equipment.
14. Do not operate any machine or equipment while under the influence of any intoxicating and/or perception-altering substance.
15. When taking a photograph, be sure to stand in a safe spot. Don't back into danger!
16. Refrain from storing chemicals in glass bottles or on high shelves where they may fall and cause injury.
17. Avoid chemical spills on clothing. Such spills may cause skin irritation and/or discoloration of the fabric.
18. Do not touch electrical devices when near the sink, unless they are grounded.
19. Wear rubber gloves while mixing or using chemicals if one is subject to allergies.
20. Wash the hands carefully after developing film and keep them away from the face while working in the darkroom.
21. Wear aprons, rubber gloves, and chemical goggles when preparing and pouring chemical solutions. Always mix chemicals according to the manufacturer's instructions; never take internally.
22. Keep the darkroom clean and the floor free of obstructions. Due to the dim light in darkrooms, one should always use extreme caution to keep from running into objects. Do not start working until the eyes adjust to the light.
23. Report worn electrical cords and broken equipment to the teacher.
24. Do not attempt underwater photography unless necessary training in diving techniques has been taken prior to the attempt.
25. Pregnant women should check with the teacher or their doctor for any additional health hazards involved in photography.

PHOTOGRAPHY GENERAL SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

Multiple Choice

- _____ 1. Pupils are allowed to run in the shop: (a) when in a hurry, (b) when the bell rings, (c) during a fire drill, (d) never.
- _____ 2. No watches, rings, or other jewelry should be worn in class because: (a) the teacher forbids it, (b) they may get lost, (c) they may be caught in equipment or shorted electrically, causing severe injury, (d) they might get dirty.
- _____ 3. Materials should not be left on the floor because they: (a) may be thrown away by the custodian, (b) represent a safety hazard, (c) are hard to replace, (d) may get dirty.
- _____ 4. Keeping the floor in safe working condition is the responsibility of: (a) the custodian, (b) the teacher, (c) the pupils, (d) all of these.
- _____ 5. Turning on a switch for another person may: (a) cause serious injury to him/her, (b) be a big help, (c) blow a fuse, (d) be a good thing to do.
- _____ 6. Overloaded electrical circuits may cause: (a) a blown fuse or a fire, (b) a bent wire, (c) a shock, (d) a defective circuit breaker.
- _____ 7. Frayed or defective extension or power cords could cause: (a) possible serious injury from shock or burns, (b) dim lights, (c) no serious damage, (d) the equipment to stop running.
- _____ 8. Solvent, not gasoline, should be used for cleaning because it: (a) cleans better, (b) evaporates faster, (c) will not catch fire as easily, (d) is cheaper to buy.
- _____ 9. Flammable liquids should be stored in a metal safety can to: (a) prevent evaporation, (b) reduce fire hazards, (c) keep them out of the way, (d) make them easy to find.

- _____ 10. Smoking is allowed in the shop: (a) before and after class, (d) during breaks, (c) during lunch hour, (d) never.
- _____ 11. Oily waste and rags should always be: (a) placed in the waste-basket, (b) rolled in a tight bundle, (c) placed in a metal self-closing can, (d) left out for the next person to use.
- _____ 12. Scraps and other trash: (a) should be left on the floor and removed at the end of class, (b) should be placed in the wastebasket, (c) can be ignored since they do not cause a safety hazard, (d) should be left for the custodian to clean up.
- _____ 13. Pupils should be especially alert to danger from accidents when: (a) using unfamiliar tools or equipment, (b) trying to hurry to complete a project, (c) the teacher is out of the room, (d) all of these.
- _____ 14. If chemicals are spilled on the floor: (a) clean them up immediately, (b) walk around them carefully so as not to fall, (c) clean them up at the end of class, (d) warn other pupils so they will not step in the spilled area.
- _____ 15. When using solvents or chemicals, be sure to: (a) keep the hands away from the eyes and mouth, (b) wash the hands thoroughly when finished, (c) refrain from eating while working, (d) do all of these.
- _____ 16. Goggles or face shields should be used when working with eye hazards such as: (a) flying particles, (b) chemicals, (c) corrosive substances, (d) all of these.
- _____ 17. When mixing acids: (a) always pour water into acid, (b) pour acid into water, (c) pour either acid into water or water into acid, (d) refrain from mixing acid and water.
- _____ 18. Contents of bottles should be identified by: (a) taste, (b) smell, (c) reading and label, (d) asking another pupil.
- _____ 19. The work area should always be kept: (a) cluttered, (b) neat, (c) dirty, (d) none of these.
- _____ 20. Tools should always be: (a) left on tables, (b) left on equipment, (c) put away when not in use, (d) carried in the pocket.
- _____ 21. On any job, always use: (a) the tool which is handy, (b) the right tool for the job, (c) whatever everyone else uses, (d) whatever one wants.
- _____ 22. Tools should be kept: (a) where they belong, (b) clean, (c) in working condition, (d) all of these.

- ____ 23. Dull, broken or worn-out tools or equipment should be: (a) used carefully, (b) thrown away, (c) reported to the teacher, (d) reported to other pupils.
- ____ 24. Cutting tools should never be: (a) dull, (b) carried in the pocket, (c) left lying around the work area, (d) all of these.
- ____ 25. All equipment should be operated only when: (a) the teacher is out of the room, (b) the teacher has given permission, (c) one has learned how after having watched others do it, (d) it is necessary to do so.
- ____ 26. If one does not thoroughly understand an operation, he/she should: (a) ask another pupil for help, (b) go ahead anyway, (c) ask the teacher for help, (d) wait until tomorrow.
- ____ 27. When using a stepladder, open it fully; then: (a) it is safe to climb, (b) set both spreaders before climbing, (c) set one spreader before climbing, (d) none of these.
- ____ 28. Equipment should not be used before, during, or after class hours unless: (a) permission has been given, (b) the room is open, (c) the teacher has given permission and the room is open, (d) none of these.
- ____ 29. Before using equipment in the photo lab, one must: (a) receive safety instruction, (b) get the teacher's permission, (c) know what he/she is doing, (d) be sure to have all of these.
- ____ 30. Proper goggles, aprons, and other protective devices are worn: (a) only when the teacher is in the room, (b) on any jobs which require them, (c) only when one is told to do so, (d) only when others are watching.
- ____ 31. Before operating any equipment: (a) tuck in loose clothing, (b) roll up long sleeves, (c) remove jewelry, (d) do all of these.
- ____ 32. Distracting a fellow worker's attention for a moment: (a) can cause an accident, (b) is permissible when the teacher is out of the room, (c) is permissible when the teacher is in the room, (d) keeps him/her alert.
- ____ 33. All cuts scratches, burns, or puncture wounds: (a) can become infected, (b) should be reported, (c) should be treated immediately, (d) all of these.
- ____ 34. If an object is too heavy or awkward to lift: (a) get some help, (b) show independence by lifting it alone, (c) take a chance that it won't be dropped, (d) leave it to do later.

- ____ 35. All fire hazards should be: (a) reported to the teacher, (b) ignored, (c) reported to fellow pupils, (d) reported to the principal.
- ____ 36. Injuries often happen to people who: (a) take chances, (b) ignore safety rules, (c) commit unsafe acts, (d) do all of these.
- ____ 37. The main reason for keeping materials, tools, and scraps off the floor is: (a) it looks sloppy, (b) they might get damaged, (c) they are a safety hazard, (d) they may get dirty.
- ____ 38. Defective electrical equipment or wiring should be: (a) repaired at once, (b) reported to the teacher, (c) used with care, (d) reported to the custodian.
- ____ 39. Accidents can be : (a) increased, (b) decreased, (c) prevented, (d) all of these.
- ____ 40. All injuries should be reported to the teacher: (a) so that an accident report can be filled out, (b) so the hazard can be eliminated, (c) in order to get first aid if necessary, (d) all of these.
- ____ 41. Always replace corks or caps on bottles because this will help: (a) keep the sink area clean, (b) eliminate spilling, (c) keep the contents from evaporating, (c) all of these.
- ____ 42. After handling any chemicals or chemical solutions: (a) wash the hands thoroughly, (b) tell the teacher that the work is finished, (c) continue working as usual, (d) leave things out for the next person.
- ____ 43. Combustible materials such as solvents, rubber cement, etc. should be: (a) stored in fireproof containers, (b) used only in well-ventilated areas, (c) kept away from flames and sparks, (d) all of these.
- ____ 44. If a pupil is not sure about the operation of a certain piece of equipment, he/she should: (a) read about it in the textbook, (b) be checked out on it by the teacher, (c) ask another pupil for help, (d) learn to run it by watching others.
- ____ 45. Before using any equipment, a pupil must: (a) pass a safety test on that machine, (b) get permission from the teacher, (c) check the equipment for proper conditions, (d) do all of these.
- ____ 46. "Horseplay" in the classroom: (a) is forbidden at all times, (b) must be saved until after clean-up, (c) should be limited to harmless practical jokes, (d) is all right if work is not hampered.

- _____ 47. A person who needs to lift a heavy object should: (a) use the arm and back muscles, (b) bend at the knees, (c) use the back muscles only, (d) bend at the waist.
- _____ 48. If a safety hazard exists in the shop: (a) file a hazard report, (b) tell other pupils, (c) tell the teacher immediately, (d) be extra careful.
- _____ 49. Paper should be handled carefully because: (a) the surface may be glossy, (b) the edges can cut the skin, (c) it may roll, (d) it gets dirty easily.
- _____ 50. When mixing chemicals: (a) avoid skin contact, (b) wear safety glasses, (c) avoid inhaling fumes, (d) do all of these.
- _____ 51. Smoking is allowed in the photo lab: (a) before and after class, (d) during breaks, (c) during lunch hour, (d) never.
- _____ 52. A person taking a photograph should never endanger: himself/herself and the model, (b) himself/herself and the camera, (c) the model and the cameras, (d) none of these.
- _____ 53. The following protection should be worn when preparing chemical solutions: (a) apron and rubber gloves, (b) goggles and rubber gloves, (d) goggles, rubber gloves, and apron, (d) apron and goggles.
- _____ 54. A bottle of strong acid or alkali must not be shaken because: (a) it may explode, (b) it may spill, (c) it may evaporate faster, (d) it may be dropped.
- _____ 55. Splashing or spilling chemicals on clothing: (a) may cause skin irritation, (b) may discolor clothing, (c) wastes chemicals, (d) does all of these.

GENERAL PHOTOGRAPHY SAFETY QUIZ KEY;

1. D	21. B	41. D
2. C	22. D	42. A
3. B	23. C	43. D
4. D	24. D	44. B
5. A	25. B	45. D
6. A	26. C	46. A
7. A	27. B	47. B
8. C	28. C	48. C
9. B	29. D	49. B
10. D	30. B	50. D
11. C	31. D	51. D
12. B	32. A	52. A
13. D	33. D	53. C
14. A	34. A	54. A
15. D	35. A	55. D
16. D	36. D	
17. B	37. C	
18. C	38. B	
19. B	39. C	
20. C	40. D	

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REFERENCES

Materials were selected and reviewed from the following sources, and in some instances were incorporated in the production of the preceding unit.

Ohio Industrial Arts and Vocational Education Safety Manual Safety Planning in Graphic Communications Education Washington State Industrial Arts Safety Guide

Wichita State University Photography Safety Instruction--Dr. Alan Aagaard

METALS

1. Suitable eye protectors shall be provided where machines or operations present the hazard of flying objects, glare, liquids, injurious radiation, or a combination of these hazards. (OSHA)
2. Respirators shall be provided when such equipment is necessary to protect the health of the pupil. (OSHA)
3. Head protection shall be used in any area where there is danger from falling or flying objects, and from limited electrical shock and burn. (OSHA)
4. Protection against the effect of noise shall be provided when the sound level exceeds 90 decibels for eight hours per day, 94 decibels for four hours per day, 100 decibels for two hours, or 105 decibels for one hour. Exposure to impulsive impact should never exceed the 140 decibel peak sound. (OSHA)
5. Loose clothing (such as tails, ties, lapels, and cuffs), torn clothing, or similar garments which can become entangled in moving machinery shall not be worn where an entanglement hazard exists.
6. Wristwatches, rings, or other jewelry shall not be worn where they constitute a safety hazard. (OSHA)
7. Safety shoes shall be worn to protect against foot injury where heavy pieces of equipment are handled. (OSHA)
8. Portable extinguishers shall be maintained in a fully charged and operable condition and kept in their designated places. (OSHA)
9. The teacher's approval of all planned work must be secured in advance. This applies to all projects and assignments in which laboratory equipment and tools are used.
10. The metals laboratory should have a minimum work area of 75 square feet per pupil, an adequate work area of 100 square feet per pupil, or a desired work area of 125 square feet per pupil.
11. Any injury must be immediately reported to the teacher (even a slight one).

12. The rules governing operator zones shall be observed when working around tools and machines.
13. Cooperation with classmates in the pupil management program of a laboratory is important.
14. The teacher should caution any pupil he/she sees violating a safety rule.
15. Any equipment that does not seem to work properly should be reported to the teacher or lab foreman.
16. Tools and materials must be kept from projecting over the edge of benches, wherever possible.
17. A brush or piece of wood should be used to clear away dry chips from a machine or bench. (The machine must be turned off and must come to a full stop before this is done.)
18. The floor shall be kept clear of scraps and litter.
19. Bench and cabinet drawers and locker doors must be kept closed.
20. Any liquids spilled on the floor must be wiped up immediately. A rag should be used to clean oil areas.
21. Oily rags and other combustible materials shall be placed in the proper metal containers.
22. Prescribed safety instructions shall be followed when handling large, heavy, and long pieces of material.
23. A pupil must qualify as a safe machine operator by taking operator tests and following operating and safety instructions.
24. Adjustments on machines shall be checked before turning on the power. A machine should be rotated before turning on the power. This should be done with one hand revolution, whenever possible.)
25. All other pupils must be clear of the machines before the power is turned on by the pupil operator.
26. All machine safety guards shall be kept in the correct position.
27. Hands and/or fingers must be kept clear of cutting, shearing, or pinching zones.

28. A pupil should start his/her own machine and remain with it until it has been turned off and has come to a full stop.
29. Pupils must stay clear of machines being operated by others.
30. A worker must make sure that no one else enters an operator zone.
31. One must wait for machines to come to a full stop before oiling, cleaning, or adjusting.
32. The floor around machines shall be kept clean.
33. All "horseplay" must be left outside of the laboratory.
34. A pupil must never throw anything in the lab.
35. All metal bars should be carried with the forward end down, especially when going through doors or around blind corners.
36. Sheet metal or metal bars must never be left lying on the floor.
37. Gloves, or a rag in the hand, should be used when one is picking up sheets of metal.
38. A file should not be struck against a vise or a machine (for the purpose of cleaning it).
39. Tools must not be left lying on the floor, on ladders, or in high places from which they may fall. When one is through with them, they should be returned to the tool panel.
40. Any metal suspected of being hot should be tested with a moistened finger before a person grasps it.
41. All wrenches and other tools must be removed from a machine before the power is turned on.
42. A file must never be used unless it is equipped with a handle.
43. A person should lift and carry only what he/she can handle. Help should be secured when carrying heavy or bulky loads.
44. Heavy objects should be lifted with the legs to avoid back and abdominal injuries. Feet should be kept close to the object and close together.
45. A person must be very careful when setting down heavy loads.

46. The proper respect for school property should be displayed at all times. There is a proper and intended use for each tool.
47. Pupils must share in the task of leaving the lab in a clean condition for the next class, and in other matters concerning lab organization. Good housekeeping is essential for safety.
48. Fingers and hands must be kept away from the moving parts of machines.
49. The power must be turned off immediately if any unusual noise develops.
50. A dull cutting tool should never be used.
51. A machine must not be fed until it has reached its full momentum.
52. A pupil should not help an operator unless specifically asked to do so by the teacher.
53. Stock should never be forced into a machine faster than it will normally cut.
54. It is not wise to hurry when working at a machine.
55. A person should never attempt to stop a machine after the power has been turned off by catching the moving parts or by applying friction with the hand.
56. The machine must be allowed to come to a dead stop before oiling, cleaning, or adjusting it.
57. A person should never leave a machine until it has been turned off.
58. No machine is to be operated while the teacher is out of the room.
59. All measurements on work should be made while the machine is at a dead stop.
60. The machine must be cleaned after each use.
61. A person who finishes a special setup should remove any special attachments and then adjust the machine for normal use.

METALS SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

(Circle true or false)

- | | | |
|--|---|---|
| 1. Before working in the metals lab, one should know where all the fire extinguishers are located. | T | F |
| 2. Oily rags should be put in the trash basket. | T | F |
| 3. All metal bars should be carried with the forward end up. | T | F |
| 4. The danger in the sheet metal area is from flying chips. | T | F |
| 5. Hot metal should be left on the floor by the forge. | T | F |
| 6. Metal chips should be cleaned from machines with a brush. | T | F |
| 7. A person should stand in front of a machine when turning it on. | T | F |
| 8. A person must give all of his/her attention to a machine when operating it. | T | F |
| 9. A machine should be turned on to see what will happen. | T | F |
| 10. Tools should be carried with the sharp point down. | T | F |
| 11. Safety glasses are required while working with any machinery in the shop. | T | F |
| 12. A person can walk away from a machine while it is still moving if it has been turned off. | T | F |
| 13. Metal suspected of being hot should be tested with a moistened finger. | T | F |

14.	Long sleeves should be rolled up and shirt tails tucked in when operating machinery.	T	F
15.	Sometimes it is all right to "hurry up" when operating machinery.	T	F
16.	One can visit with other machine operators any time one feels like it.	T	F
17.	Scraps belong in the scrap barrel, not on the floor.	T	F
18.	Rings, watches, and jewelry should be removed when working around moving machinery in order to avoid entanglement.	T	F
19.	Ear protectors should be worn if the machine one is operating causes any hearing discomfort.	T	F
20.	All injuries should be reported to the teacher.	T	F
21.	Not more than three people should be allowed in a machine operating zone.	T	F
22.	Pupils violating safety rules should be cautioned.	T	F
23.	Machines that are not working properly should be fixed.	T	F
24.	Lab floors should be swept only at the end of the class period.	T	F
25.	Spilled liquids should be wiped up immediately.	T	F
26.	Any "horseplay" in the lab should be done at the beginning of the class period.	T	F
27.	Heavy objects should not be lifted with the legs.	T	F
28.	Not all cutting tools need to be sharp to work properly.	T	F
29.	Special attachments or setup should be left on the machine so that other pupils may use them.	T	F
30.	A person should stand by a machine that has been turned off until it has come to a complete stop.	T	F

- | | | |
|--|---|---|
| 31. Only the simple machines should be operated while the teacher is out of the room. | T | F |
| 32. All machine guards should be checked before turning on the power. | T | F |
| 33. Only large pieces of sheet metal should be picked up without gloves. | T | F |
| 34. Rotating machine parts should be slowed down by hand only after the power has been turned off. | T | F |
| 35. Diameter measurements may be taken while the machine is running. | T | F |

REFERENCES

Materials were selected and reviewed from the following sources and in some instances were incorporated in the production of the preceding unit.

1. Baldor Electric Company
2. Bridgeport Textron Machine Division
3. Dake Corporation
4. DiAcro Houdville - Houdville Industries
5. Grinding Wheel Institute
6. K. O. Lee Company
7. McEnglevan Heat Treating Mfg.
8. NIOSH - U.S. Department of Health, Education, and Welfare
9. Ohio Industrial Arts and Vocational Education Department
10. OSHA - U.S. Department of Labor
11. Pennsylvania Industrial Arts Association and Department of Education
12. Pittsburg State University - L. Duane Griffin
13. Powermatic Tool Company
14. Rockwell Delta - Rockwell International
15. Roper Whitney, Incorporated
16. Shawnee Mission Public Schools - Bill Studwin
17. South Bend Lathe, Incorporated
18. Utah State Safety Guide
19. Washington State Industrial Arts Safety Guide
20. Wyoming State Department of Education

WELDING

The American Welding Society has identified over 80 different types of welding and allied processes in commercial use. Some of the more common types include: oxygen-acetylene, gas metal and gas tungsten arc welding (TIG), shielded-metal arc welding (MIG), resistance welding, and brazing. An industrial welding process may be done manually, or may be a completely automatic operation done by a welding machine.

Interest has centered around the health and safety hazards of arc welding. With proper environmental controls and work procedures, the hazards may be eliminated.

WELDING HAZARDS

Welding problems can vary with the method of welding employed, the location of work, the materials being welded, and the control measures employed.

Certain hazards are common to most arc welding processes. The principal hazards are: damage to eyes and skin from infrared and ultraviolet radiation (from the molten metal and electric arc respectively), burns from contact with hot metal or sparks, adverse health effects from breathing metal fumes and gases, accidents from materials handling, and electrical shock.

Eye exposure to ultraviolet radiation from the arc can result in a condition known as "welder's flash" or "arc eye"--an irritation with a painful sensation. Repeated exposure may result in permanent eye injury. Overexposure to ultraviolet radiation may also cause severe skin burns. Infrared radiation from the molten metal produces a sensation of burning on the skin, but is usually not of sufficient intensity to cause permanent skin damage.

The hazard potential from the fumes and gases generated by a welding operation depends upon the chemical of the materials being used, the concentrations of the chemicals in the worker's breathing zone, and the duration of exposure. The composition of the fume itself depends upon the various materials involved in the welding process. Air containments may arise from the various components of the welding rods; oxides of the metals and alloying elements being joined--ozone, carbon monoxide, and the oxides of nitrogen.

Ozone and the oxides of nitrogen are the principal toxic (poisonous) gases produced by the arc welding process. Ozone, an intensely irritating gas, is produced by the action of the electric arc through the air. Toxic fumes are generated from welding on metals coated with or containing alloys of lead, zinc, cadmium, or beryllium. Some paints may also produce toxic fumes when heated with the welding torch.

Fumes from many metals including cadmium, copper, nickel, and zinc are capable of producing metal fume fever. The symptoms are similar to those of influenza and usually occur a few hours after exposure. The symptoms usually last less than 24 hours and a temporary immunity follows. As a result, welders are more susceptible to this condition on Mondays or on workdays following a holiday than on other workdays.

Most welding is done with coated rods or electrodes. Welding rod coatings and cores contain various metal oxides, hydroxides, carbonates, silicates, fluorides, and organic materials. Fluorides are significant because of their toxicity. They are contained in low hydrogen, stainless, and some hard-surfacing electrodes; mild and low alloy, tubular, open-arc wires, most non-ferrous electrodes and fluxes; and many brazing and soldering fluxes.

Some silver solders contain cadmium. Even a brief overexposure to cadmium fumes can produce severe lung irritation, which may be fatal. The welding of metal alloys, particularly those containing beryllium and its compounds, can also cause serious lung problems.

The avoidance of electrical shock is largely within the control of the welder. Electrical shock experiences at welding voltages usually do not cause severe injury. However, under certain conditions they can be lethal. Even mild shocks can produce involuntary muscle contractions leading to injurious falls. The severity of the shock is determined largely by the path of the current and the amount of current flowing through the body. This is determined by the voltage and the contact resistance of the area of skin involved. Wearing clothing which is damp from perspiration, or working in wet conditions, reduces skin contact resistance and thus increases the risk of electrical shock.

CONTROLLING THE HAZARDS

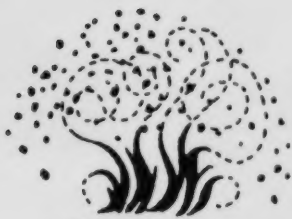
Arc welding hazards can be controlled by using effective ventilation, by following safe working practices (such as heeding safety labels) and by using respirators and personal protective equipment.

The proper application of local mechanical exhaust ventilation or general dilution ventilation will vary with the type of welding being performed. In open-air welding or in large, well-ventilated maintenance shops where welding is not done constantly, the hazards from airborne

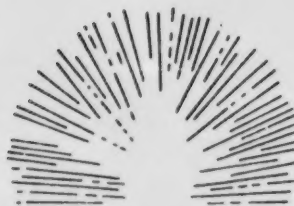
contaminants may not be significant except for the more toxic fumes such as cadmium, beryllium, lead, and zinc. For heavy or production welding indoors, local or general dilution ventilation must be provided. Specifically designed local exhaust ventilation and/or approved supplied air respirators will usually be required for welding on or with materials containing fluorides, lead, cadmium, and beryllium, or other highly toxic materials, and when welding in confined spaces such as tanks or boilers. Local exhaust ventilation should be located as near to the welding operation as possible for greater capture efficiency.

Welders' helmets and goggles with proper filter-plated and approved filter lenses must be worn.

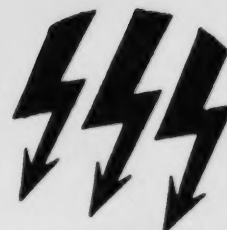
HEALTH HAZARDS



FUMES AND GASES
can be dangerous to
your health.



ARC RAYS can
injure eyes and
burn skin.



ELECTRIC SHOCK
can kill.

DEFINITIONS

TOXICITY-- The ability of a substance to cause an injury or illness.

HAZARD-- The likelihood of a substance causing an injury or illness.

The above definitions indicate that the toxicity of a substance - a fume, dust, gas, or liquid - is only one factor in determining its effect on the worker. In general, the specific health hazards of any welding or cutting operation depend on (1) the type of welding or cutting, (2) the type of filler metal, fluxes, coatings, and base metals being used, (3) the length of the exposure of the workers, and (4) the extent to which good industrial hygiene practices are used.

ACUTE EXPOSURE--A rapid absorption of a substance into the body. The exposure is usually sudden, and there is a critical period during which death or serious injury may occur unless prompt medical action is taken.

CHRONIC EXPOSURE--The absorption of small doses of a toxic substance over a long period of time. When the chemical is taken in faster than the body can eliminate it, accumulation in the body begins. Harmful effects from the chemical may become evident. These effects continue even after exposure has ended.

ROUTES OF ENTRY

INHALATION

INGESTION

ABSORPTION

CHEMICAL AGENTS

ACETYLENE--Acetylene is one of the most commonly used fuels for gas welding, cutting, and brazing. It is capable of displacing oxygen from the atmosphere, reducing it to a level below that required by the body. The major hazard associated with acetylene, however, is its explosion potential. Because acetylene becomes unstable at excessive pressures, it should not be pressurized above 15 psi gauge (or 30 psi absolute).

ALUMINUM--In welding and cutting operations, aluminum is a major component of metals and filler metals. The inhalation of aluminum dust or its compounds, including aluminum oxide fumes, is not known to have any effects on man.

ANTIMONY--Antimony is used as an alloying metal in many speciality metals. Antimony and its compounds irritate the skin and mucous membranes. Skin contact with antimony can result in inflammation of the hair follicles. A greater infection may develop that produces scars. Symptoms of excessive exposure to air-borne antimony are a metallic taste in the mouth, vomiting, loss of appetite, and general stomach distress.

ARSENIC--Arsenic may be encountered in welding and cutting operations as a component of various alloys. It is used as a hardening agent. Welding or cutting on metals that are painted with arsenic compounds can also be hazardous. Exposure to excessive concentrations of arsenic compounds produces inflammation of the mucous membrane surfaces and an irritation of exposed skin. Common symptoms in exposed workers include skin irritation, irritation of the nasal passages, laryngitis, and mild irritation of the lungs and eyes.

ASBESTOS--Asbestos is found in the coating of some welding rods. Long-term exposure to high concentrations of asbestos fibers causes asbestosis, a disease of the lung. Under normal circumstances of welding with coated rods containing asbestos, hazardous concentrations are not produced. However, the welder should be sure that good ventilation is in operation during welding processes in which such rods are used.

BERYLLIUM--Beryllium is sometimes used as an alloying element with copper and other base metals. Acute exposure to high concentrations of beryllium can result in chemical pneumonia. Long-term exposure can result in shortness of breath, chronic cough, and significant weight loss, accompanied by fatigue and general weakness.

CADMIUM--Cadmium is used frequently as a rust preventive coating on steel and also as an alloying element. Acute exposures to high concentrations of cadmium fumes can produce severe lung irritation. Long-term exposure to low levels of cadmium in the air can result in emphysema (a disease affecting the ability of the lung to absorb oxygen) and can damage the kidneys.

CARBON MONOXIDE--Carbon monoxide is a gas usually formed by the incomplete combustion of various fuels. Welding and cutting may produce significant amounts of carbon monoxide. In addition, welding operations that use carbon dioxide as the inert gas shield may produce hazardous concentrations of carbon monoxide in poorly ventilated areas. This is caused by a "breakdown" of the shielding gas. Carbon monoxide is odorless and colorless and cannot be detected. Common symptoms of over-exposure include pounding of the heart, a dull headache, flashes before the eyes, dizziness, ringing in the ears, and nausea.

CHROMIUM--Chromium is the primary alloying agent in stainless steel. Chromium compounds are strong oxidizing agents and are extremely toxic and irritating to the skin, eyes, and mucous membranes. Although welding under normal operating conditions would not be expected to produce hazardous concentrations of chromium compounds, welding of stainless steel should be carried out in well-ventilated areas.

CHLORINATED HYDROCARBON SOLVENTS--Various chlorinated hydrocarbons are used in degreasing or other cleansing operations. The vapors of these solvents are a concern in welding and cutting because the heat and ultraviolet radiation from the arc will decompose the vapors and form highly toxic and irritating phosgene gas. (See Phosgene.)

COBALT--Cobalt appears as an alloying agent in high-strength, high-temperature alloys. The inhalation of cobalt fumes can cause shortness of breath and coughing. In most cases, the symptoms disappear after the exposure ends.

FLUORIDES--Fluoride compounds are found in the coatings of several types of fluxes used in welding. Exposure to the fluxes may irritate the eyes, nose, and throat. Repeated exposure to high concentrations of fluorides in the air over a long period may cause pulmonary edema (fluid in the lungs) and bone damage. Exposure to fluoride dusts and fumes has also produced skin rashes.

IRON OXIDE--Iron is the principal alloying element in steel manufacture. During the welding process, iron oxide fumes arise from both the base metal and the electrode. The primary acute effect of this exposure is irritation of the nasal passages, throat, and lungs. Although long-term exposure to iron oxide fumes may result in pigmentation of the lungs, most authorities agree that these iron deposits in the lung are not dangerous.

LEAD--The welding and cutting of lead-bearing alloys or metals whose surfaces have been painted with lead-based paint can generate lead oxide fumes. The inhalation and ingestion of lead oxide fumes and other lead compounds will cause lead poisoning. Symptoms include a metallic taste in the mouth, loss of appetite, nausea, abdominal cramps, and insomnia. In time, anemia and a general weakness, chiefly in the muscles of the wrists develop.

MAGNESIUM--Magnesium and magnesium-aluminum alloys, both found as alloys in steel, are used in the manufacture of structural parts for airplanes and in tool making. Welding and cutting on magnesium-containing metals produces magnesium oxide fumes. Exposure to these fumes can irritate the eyes, nose, and throat.

MANGANESE--Manganese is a constituent of many arc welding electrodes. The welding process produces manganese dioxide fumes. In most cases, the concentrations generated are not hazardous. Nevertheless, cases of manganese poisoning have been reported. Symptoms of excessive exposure are weakness, instability, difficulty in walking, and monotonous and intermittent speech.

MERCURY--Mercury compounds are used to coat metals to prevent rust or inhibit foliage growth (marine paints). Under the intense heat of the arc or gas flame, mercury vapors will be produced. Exposure to these vapors may produce stomach pain, diarrhea, kidney damage, or respiratory failure. Long-term exposure may produce tumors, emotional instability, and hearing damage.

MOLYBDENUM--Molybdenum, a constituent of some grades of steel, is sometimes encountered during welding and cutting. Molybdenum does not present a health hazard in most operations.

NITROGEN OXIDES--The intense energy produced by the arc can create nitrogen oxides. The most significant form is nitrogen dioxide. This gas is mildly irritating to the eyes, nose, and upper respiratory tract, at relatively low concentrations. It is hard to detect, and dangerous concentrations can be inhaled without any discomfort, even to the point that injury to the lungs results.

OZONE--Ozone is a gas that is produced by the ultraviolet radiation in the air in the vicinity of arc welding and cutting operations. Ozone is very irritating to all mucous membranes, with excessive exposure producing pulmonary edema. Other effects of exposure to ozone include headache, chest pain, and dryness in the respiratory tract.

PHOSGENE--Phosgene is formed by the decomposition of chlorinated hydrocarbon solvents by ultraviolet radiation. It reacts with moisture in the lungs to produce hydrogen chloride, which in turn destroys lung tissue. For this reason, any use of chlorinated solvents should be well away from welding operations or any operations in which ultraviolet radiation or intense heat is generated.

PHOSPHINE--Phosphine or hydrogen phosphide can be produced when steel coated with phosphate rustproofing is welded. Excessive concentrations of this gas are irritating to the eyes, nose, and skin. Acute effects, besides irritation, include headache, dizziness, and pulmonary irritation. Chronic exposure may result in disturbances of sight and speech.

SILICONE DIOXIDE--Silicone dioxide (free silica) is found as a constituent in the coatings of several welding rods. Depending on the extent of welding, significant concentrations of airborne free silica can be generated. Long-term exposure to excessive concentrations of free silica can lead to silicosis, a development of fibrosis in the lungs which prevents normal breathing.

ZINC--Zinc is used in large quantities in the manufacture of brass, galvanized metals, and various other alloys. Inhalation of zinc oxide fumes can occur when welding or cutting on zinc-coated metals. Exposure to these fumes is known to cause metal fume fever. Symptoms of metal fume fever are very similar to those of common influenza. They include fever (rarely exceeding 102 degrees F), chills, nausea, dryness of throat, cough, fatigue, and general weakness and aching of the head and body. The victim may sweat profusely for a few hours, after which the body temperature begins to return to normal. The symptoms of metal fume fever have rarely, if ever, lasted beyond 24 hours. The subject can then return to work without any apparent after-effects. Workers appear to be more susceptible to the onset of this condition on Mondays or on week-days following a holiday than they are on any other days.

PHYSICAL AGENTS

ULTRAVIOLET RADIATION--Ultraviolet radiation (UV) is generated by the electric arc in the welding process. Skin exposure to UV can result in severe burns, in many cases without prior warning. UV can also damage the lens of the eye. Many arc welders are aware of the condition known as "arc-eye", a sensation of sand in the eyes. This condition is caused by excessive eye exposure to UV. Ultraviolet rays also increase the skin effects of some industrial chemicals (coal tar and cresol compounds, for example).

INFRARED RADIATION--Exposure to infrared radiation (IR), produced by the electric arc and other flame cutting equipment, may heat the skin surface and the tissues immediately below the surface. Except for this effect, which can progress to thermal burns in some situations, infrared radiation is not dangerous. Most welders protect themselves from IR and UV with a welder's helmet (or glasses) and protective clothing.

INTENSE VISIBLE LIGHT--Exposure of the human eye to intense visible light can produce adaption, pupillary reflex, and shading of the eyes. Such actions are protective mechanisms to prevent excessive light from being focused on the retina. In the arc welding process, eye exposure to intense visible light is prevented for the most part by the welder's helmet. However, some individual have sustained retinal damage due to careless "viewing" of the arc. At no time should the arc be observed without eye protection.

ENVIRONMENTAL CONTROL

VENTILATION--(REVIEW SECTION XI HEALTH AND ENVIRONMENTAL CONTROL)

DILUTION VENTILATION--For many welding and cutting operations, control by dilution ventilation will be sufficient. In this type of ventilation enough fresh air is added to the contaminated air that hazardous concentrations do not develop. However, the effectiveness of dilution ventilation depends on several factors:

- (a) The size of the space in which the welding or cutting is done, especially the height of the ceiling.
- (b) The total number of welders working within the space.
- (c) The hazardous chemical or physical agents produced by the welding or cutting.

Dilution ventilation is necessary whenever welding or cutting is done in a work space of less than 10,000 cubic feet per welder, in a room less than 16 feet high, in confined spaces, or where the welding space contains partitions, balconies, or other structural barriers that obstruct cross-ventilation. Otherwise, natural ventilation should be sufficient for most welding and cutting activities.

When dilution ventilation is used, ⁴ must move at least 2,000 cubic feet of air per minute per welder, unless local exhaust hoods and booths are used to control fumes where they are produced.

SPECIFIC REQUIREMENTS--VENTILATION AND RESPIRATORY PROTECTIVE EQUIPMENT

There are specific requirements concerning ventilation and respirators when welding or cutting on the following:

1. Stainless steel, lead, zinc, or cadmium;
2. Metals coated with materials (such as paint) which contain lead or mercury;
3. Fluxes or other materials containing fluorides.

These requirements are summarized below:

<u>WELDING OR CUTTING ON MATERIALS</u> <u>CONTAINING OR COATED WITH</u>	<u>LOCATION OF OPERATION</u>		
	<u>CONFINED SPACES</u>	<u>INDOORS</u>	<u>OUTDOORS</u>
Lead	A or B	A	C
Zinc	A or B	A	
Cadmium*	A or B	A or B	C
Beryllium*	A and B	A and B	A and B
Mercury*	A or B	A or B	C
Fluorine*	A or B		
Stainless Steels	A	A	A

*Unless atmospheric tests under the most adverse conditions have been established that the workers' exposures are within acceptable concentrations as defined by 1910.1000.

A = Mechanical local exhaust ventilation by means of either hoods or booths; with sufficient airflow to maintain a velocity, away from the worker, of at least 100 linear feet per minute

B = NIOSH approved supplied-air respirator, or equivalent

C = NIOSH approved respiratory protective equipment, or equivalent

ADDITIONAL SAFETY AND HEALTH CONSIDERATIONS

CONFINED SPACES--Within each confined space, ventilation must be provided to prevent the accumulation of toxic or combustible materials and to supply oxygen.

1. All replacement air must be fit to breathe, or an approved air line or hose mask respirator must be worn. Oxygen must not be used for ventilation.
2. Workers exposed to substances immediately hazardous to life must wear either hose masks with blowers or self-contained breathing equipment.
3. Gas cylinders and welding machines must be left outside the space. Heavy equipment mounted on wheels must be securely blocked to prevent accidental movement.
4. If the entry to the space is through a small opening or manhole, or the atmosphere is immediately hazardous to life, means must be provided for quick removal in case of an emergency. If safety belts and lifelines are used, they must be attached so that the worker may be easily removed. An attendant trained in rescue procedures must be continuously present outside to observe and assist if needed.

LABELS--Information on symptoms of overexposure, first aid procedures, and control of employee exposure is usually provided for substances such as filler metals, fusible granular materials, and welding fluxes. This information is frequently printed on tags or on boxes or other containers. One should become familiar with these directions and follow them.

GENERAL WORK PRACTICES

1. Welders, or their helpers, working on platforms, scaffolds, or runways must be protected by railings, safety belts, lifelines, or other equally effective safeguards.
2. Welding cables or other items of equipment must be placed so that they are clear of passageways, ladders, and stairways.

3. Each welder is responsible for marking the hot metal or providing some means of warning for others to keep away.
4. Hard hats or other head protection may be required where sharp or heavy falling objects or bumping in confined spaces may constitute a hazard.

PERSONAL PROTECTIVE EQUIPMENT

After environmental controls have been analyzed, personal protective equipment should be considered. Most welders recognize the need for personal protective equipment, particularly for the eyes and skin.

EYE AND FACE PROTECTION (Refer to Section X Personal Protective Equipment)

One of the primary concerns in welding and cutting is the protection of the eyes, face, and neck against flying sparks and radiant energy. Ultraviolet, visible, and infrared radiation from the arc can harm the eyes. To properly protect the eyes and face, helmets must be used for all arc welding and cutting. Helmets must be designed to protect the face, forehead, neck, and ears from direct exposure to radiation from the arc.

Proper filter plates have been identified by the National Bureau of Standards. The recommended filter plates are identified by shade number and are related to the type of arc welding or cutting operation listed in the table on the next page.

Goggles or other suitable eye protection must be used for gas welding or oxygen cutting. Spectacles with suitable filter lenses and without side shields are permitted during gas welding. Goggles should have vents near the lenses to prevent fogging. Cover lenses or plates should be provided to protect the filter lens and helmet. All glass used for lenses should be ground properly so that front and rear surfaces are smooth. Filter lenses must be marked so that the shade number can be readily identified.

Selection Chart for Eye and Face Protectors for Use in Industry, Schools, and Colleges

This Selection Chart offers general recommendations only. Final selection of eye and face protective devices is the responsibility of management and safety specialists. (For laser protection, refer to American National Standard for Safe Use of Lasers, ANSI Z136.1-1976.)



- | | |
|--|---|
| <p>1. GOGGLES, Flexible Fitting, Regular Ventilation</p> <p>2. GOGGLES, Flexible Fitting, Hooded Ventilation</p> <p>3. GOGGLES, Cushioned Fitting, Rigid Body</p> <p>*4. SPECTACLES, without Sideshields</p> <p>5. SPECTACLES, Eyecup Type Sideshields</p> <p>6. SPECTACLES, Semi-/Flat-Fold Sideshields</p> <p>**7. WELDING GOGGLES, Eyecup Type, Tinted Lenses (Illustrated)</p> | <p>7A. CHIPPING GOGGLES, Eyecup Type, Clear Safety Lenses (Not Illustrated)</p> <p>**8. WELDING GOGGLES, Coverspec Type, Tinted Lenses (Illustrated)</p> <p>8A. CHIPPING GOGGLES, Coverspec Type, Clear Safety Lenses (Not Illustrated)</p> <p>**9. WELDING GOGGLES, Coverspec Type, Tinted Plate Lens</p> <p>10. FACE SHIELD, Plastic or Mesh Window (see caution note)</p> <p>*11. WELDING HELMET</p> |
|--|---|

*Non-sideshield spectacles are available for limited hazard use requiring only frontal protection.
 **See Table A1, "Selection of Shade Numbers for Welding Filters," in Section A2 of the Appendix.

APPLICATIONS		
OPERATION	HAZARDS	PROTECTORS
ACETYLENE-BURNING ACETYLENE-CUTTING ACETYLENE-WELDING	SPARKS, HARMFUL RAYS, MOLTEN METAL, FLYING PARTICLES	7, 8, 9
CHEMICAL HANDLING	SPLASH, ACID BURNS, FUMES	2 (For severe exposure add 10)
CHIPPING	FLYING PARTICLES	1, 3, 4, 5, 6, 7A, 8A
ELECTRIC (ARC) WELDING	SPARKS, INTENSE RAYS, MOLTEN METAL	11 (In combination with 4, 5, 6, in tinted lenses, advisable)
FURNACE OPERATIONS	GLARE, HEAT, MOLTEN METAL	7, 8, 9 (For severe exposure add 10)
GRINDING-LIGHT	FLYING PARTICLES	1, 3, 5, 6 (For severe exposure add 10)
GRINDING-HEAVY	FLYING PARTICLES	1, 3, 7A, 8A (For severe exposure add 10)
LABORATORY	CHEMICAL SPLASH, GLASS BREAKAGE	2 (10 when in combination with 5, 6)
MACHINING	FLYING PARTICLES	1, 3, 5, 6 (For severe exposure add 10)
MOLTEN METALS	HEAT, GLARE, SPARKS, SPLASH	7, 8 (10 in combination with 5, 6, in tinted lenses)
SPOT WELDING	FLYING PARTICLES, SPARKS	1, 3, 4, 5, 6 (Tinted lenses advisable; for severe exposure add 10)

- CAUTION:**
- Face shields alone do not provide adequate protection.
 - Plastic lenses are advised for protection against molten metal splash.
 - Contact lenses, of themselves, do not provide eye protection in the industrial sense and shall not be worn in a hazardous environment without appropriate covering safety eyewear.

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SELECTION OF SHADE NUMBER FOR WELDING FILTERS **

WELDING OPERATION	SUGGESTED SHADE NUMBER*
Shielded Metal-Arc Welding, up to 5/32 in (4MM) electrodes.....	10
Shielded Metal-Arc Welding, .3/16 to 1/4 in (4.8 to 6.4 mm) electrodes.....	12
Shielded Metal-Arc Welding, over 1/4 in (6.4 mm) electrodes.....	14
Gas Metal-Arc Welding (Nonferrous).....	11
Gas Metal-Arc Welding (Ferrous).....	12
Gas Tungsten-Arc Welding.....	12
Atomic Hydrogen Welding.....	12
Carbon Arc Welding.....	14
Torch Soldering.....	2
Torch Brazing.....	3 or 4
Light Cutting, up to 1 in (25 mm).....	3 or 4
Medium Cutting, 1 to 6 in (25 to 150mm).....	4 or 5
Heavy Cutting, over 6 in (150mm).....	5 or 6
Gas Welding (Light) up to 1/8 in (3.2 mm).....	4 or 5
Gas Welding (Medium) 1/8 in to 1/2 in (3.2 to 12.7mm).....	5 or 6
Gas Welding (Heavy) over 1/2 in (12.7mm).....	6 or 8

*The choice of a filter shade may be made on the basis of visual acuity and may therefore vary widely from one individual to another, particularly under different current densities, materials, and welding processes. However, the degree of protection from radiant energy afforded by the filter plate or lens when chosen to allow visual acuity will still remain in excess of the needs of eye filter protection. Filter plate shades as low as shade 8 have proven suitably radiation-absorbent for protection from the arc-welding processes.

NOTE: In gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the operation (spectrum).

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ADDITIONAL WARNINGS

(1) The arc from a welder can cause eye burn even from a distance of 200 feet. (2) Blindness is no more frequent in the welding industry than in any other industry. However, tissue injuries are more prevalent. (3) It has been proven that deep injuries to the eyes of welders can be attributed to short infrared rays.

SKIN PROTECTION (Also see Section X-Personal Protective Equipment)

Some type of protective clothing for the skin will be required for nearly all welding.

PROTECTIVE GLOVES, preferably the gauntlet type, should be worn regardless of the degree of welding performed. For light arc welding and cutting (low current densities), durable, flame-resistant cotton gloves may be used. For heavier work (higher current densities), gloves of leather or some other suitable flame-resistant material should be used.

FLAMEPROOF APRONS made of asbestos or other suitable materials should be used when additional protection against sparks and heat is needed.

FIRE-RESISTANT LEGGINGS should be used for heavier work. In production work, a sheet metal screen placed in front of the welder's legs can provide further protection against sparks and molten metal. Cape sleeves or shoulder covers, with bibs made of leather or other flame-resistant materials, should be worn during overhead welding or cutting. Skullcaps made from flame-resistant material should be worn under helmets to prevent head burns.

WOOLEN CLOTHING is preferable to cotton because it is not readily ignited and also helps protect the worker from changes in temperature. Cotton clothing, if used, should be treated with a flame-retardant. Clothing treated with nondurable flame-retardant materials should be treated again after each wetting or cleaning.

Sparks may lodge in rolled-up sleeves, pockets, or cuffs. Therefore, sleeves and collars must be kept buttoned, and pockets should be removed from the front of the clothing. The legs of trousers or coveralls should not be rolled up on the outside.

HEARING PROTECTION (Refer to Section X-Personal Protective Equipment and Section XI Health and Environmental Control)

In the event that noise limits are exceeded, administrative or engineering controls are required, if feasible. Similar administrative controls were discussed in the section on "Ventilation." Because engineering controls are not usually appropriate for the noise coming from welding processes, personal protective equipment will usually be needed. There are three basic types of personal protective devices available for noise:

1. The moldable insert type is made of materials such as rubber, plastics, or waxes. These materials are molded by the worker to fit the ear canal. This is done by rolling and shaping the material with the hands and inserting it into the ear.

2. The pre-molded plug comes in a wide variety of styles and sizes, since the human ear varies tremendously from person to person. It is important that earplugs be fitted individually by trained people. To be effective, any type of plug must be fitted properly and remain correctly seated in the ear canal.
3. The cup or muff type of hearing protector covers the entire external portion of the ear. This type of ear protection may interfere with the proper fit of the welding helmet (and vice versa), and so is probably of limited usefulness.

Another reason for wearing ear protection, not related to noise, is to prevent sparks from entering the ear canal. Such sparks can cause severe burns. Several cases of eardrum damage have been reported when welding in the vertical or overhead position.

RESPIRATORY PROTECTION (Refer also to Section X-Personal Protective Equipment)

The nature or location of the welding process may make proper ventilation difficult. Also, the welding process may produce an extremely toxic substance (cadmium or chromium, for example) in considerable quantities. In these instances, it may be necessary to use respirators.

Common respirators are not suitable for welding. The welder's helmet and welding position interfere with the fit of the respirator. However, several companies have developed a "modified" welding helmet with a built-in respirator, or one which allows a respirator to fit underneath.

THESE FIGURES ILLUSTRATE SOME HELMET/RESPIRATOR SCHEMES

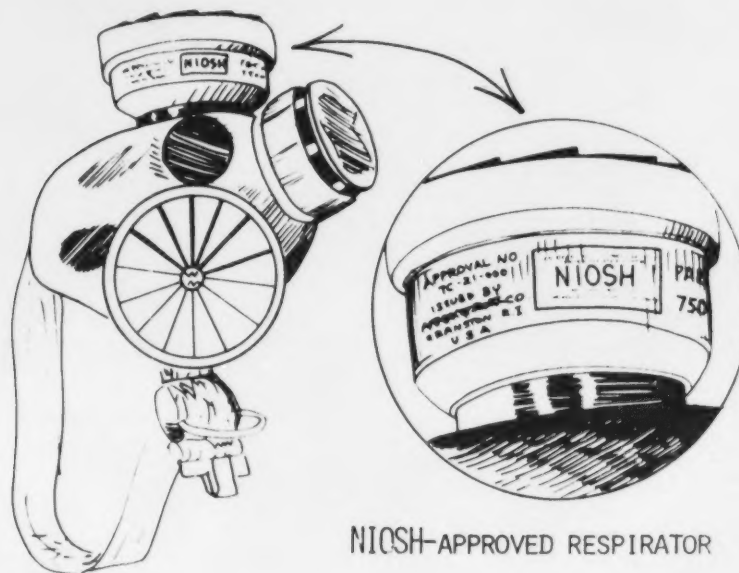


BELT-MOUNTED RESPIRATOR



LEATHER HOOD

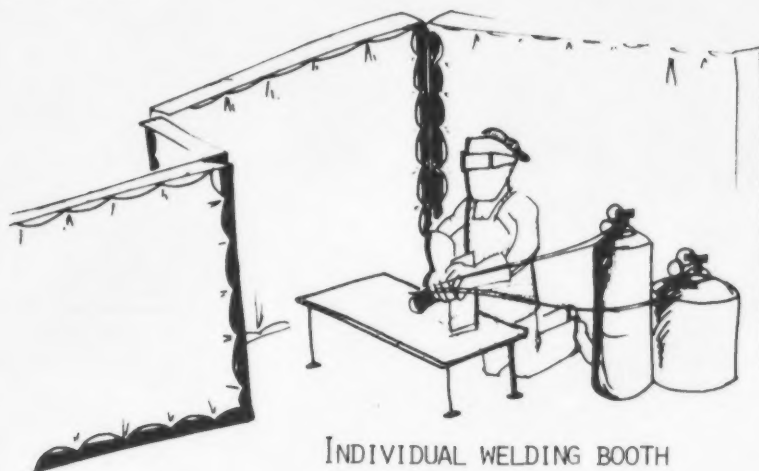
Any respirator that is worn must be approved by the National Institute for Occupational Safety and Health (NIOSH), or other competent authority, and must also be approved for protection against the contaminant in the work area. The accompanying figure shows a respirator and cartridge and has the printed approval by NIOSH.



NIOSH-APPROVED RESPIRATOR

PROTECTIVE EQUIPMENT--OTHER CONSIDERATIONS

Noncombustible or flameproof screens or shields must enclose the welding area to prevent the exposure of nearby workers to ultraviolet and infrared radiation.



INDIVIDUAL WELDING BOOTH

DANGER!!

CONTACT LENS

A man was wearing safety glasses over his contact lenses when he opened a 440 volt box to connect a welding cable. When the circuit breaker was opened, the breaker arced and a flash occurred. Later, when the man tried to remove his contact lenses, large amount of dried cornea came off with each lens.

The contacts evidently served to concentrate the heat of the arc flash on the cornea of the eye.



CONTACT LENSES SHOULD NEVER BE WORN UNDER SAFETY GLASSES OR IN ANY AREA WHERE AN ARC FLASH COULD OCCUR.

(WICHITA ELECTRICAL JATC.)

BUTANE CIGARETTE LIGHTERS

Plastic butane-filled disposable cigarette lighters may be hazardous to the safety of welders. Several welders have been fatally injured when welding sparks burned through the lighter case to ignite the butane in lighters carried in the workers' shirt pockets.

REFERENCES

Materials were selected and reviewed from the following sources, and in some instances were incorporated in the production of the preceding unit.

1. Airco Welding Products
2. American Welding Society
3. Miller Electric Manufacturing Company
4. National Institute for Occupational Safety and Health - U.S. Dept. of Health, Education, and Welfare
5. Occupational Safety and Health Administration, U. S. Department of Labor
6. Rego Company
7. Rexarc Inc.
8. University of Illinois, College of Agriculture
9. Utah State Dept. of Ed., Industrial Education Safe Guide
10. Victor - Welding and Cutting Division
11. Washington State Dept. of Education, Industrial Arts Safety Guide

PLASTICS

Safety should be uppermost in the organization and management of an educational curriculum that involves the materials and processes relevant to a plastics program. The initial responsibility for accident prevention lies in the following administrative and management areas: planning the laboratory, the selection of appropriate equipment, the elimination of health hazards from chemical agents by proper ventilation, the provision of proper personal equipment, and the evaluation of the ongoing safety programs in the plastics laboratory. The operational educational program must then address itself to the specific goals of instruction that include the following units:

1. Accidents and accident prevention.
2. Good housekeeping and the upkeep of tools, equipment, and materials.
3. Fire hazards and fire-fighting techniques.
4. Personal protective devices.
5. The interpreting and preparing of guides showing safe practices in particular situations.
6. The analyzing of shops, laboratories, and jobs for possible hazards.
7. The organization of safety lessons.
8. Accident prevention as it relates to problem pupils.
9. Evaluation of teaching-learning for safety.

BASIC PLASTICS SAFETY PRECAUTIONS

1. Wear eye protection
2. Wear the proper protective clothing for the job being done.
3. Report any defective equipment, unsafe conditions, or violations of safety rules.
4. Report any injury immediately.

5. Work with tools, machines, and equipment only after having received the necessary safety instruction.
6. Do not lift any equipment or materials that cannot be handled easily. Obtain help when carrying materials or equipment.
7. Keep the aisles and passageways clear of materials and equipment.
8. Obtain permission before using compressed air.
9. Follow the manufacturer's instruction on all equipment and in the storage, mixing, and processing of materials.
10. Use an approved paint program in the laboratory to mark and identify the hazards.

MATERIALS (OSHA)

General safety practices in the use of plastics materials and solvents should include the following points:

1. The solvents, resins, and curing agents should be treated with care because they can affect the skin, allergies, and lungs if they are misused.
2. The chemicals, if mixed incorrectly, may become explosive or constitute a fire hazard.
3. The cured resins, plus the fillers in reinforced systems (i.e. the glass in fiberglass) will cause skin irritations. Asbestos, when used as a fire-resistant alloy, is a health hazard encountered in trimming or sanding after molding.
4. The disposal of waste material and solvents requires some precautions.
5. There are gases and vapors developed during the cycle of epoxy, polyester, and foam that require proper ventilation.

BASIC MATERIALS PRECAUTIONS

1. Never taste or sniff containers to determine their nature. This is an extremely dangerous practice.
2. Do not use plastics materials if one has allergies or skin eruptions.
3. Be extremely careful to avoid skin contact with epoxy resins. Precautions should include the wearing of aprons, coveralls, and gloves; adequate washing and use of shower facilities; and the use of protective creams and adequate ventilation.

4. Protect the skin from the glass fibers that are released while sanding cured fiberglass or reinforced plastics.
5. Use chemicals that come only from labeled bottles and containers.
6. Store unstable plastic ingredients, such as catalysts, in a cool place. In a heated area, they are likely to react chemically.
7. Don't smoke in the storage areas.
8. Avoid exposure to high isocyanate in foaming systems. This exposure, by vapor or skin contact, can make one ill. Exposure for even a short time can cause severe irritation of the nose, throat, and lungs. Isocyanates can cause sensitization which is an allergic reaction. A reaction will occur any time a person is exposed if sensitization has developed.

EQUIPMENT (OSHA)

All the equipment used in the plastics laboratory will have the following things in common: the element of heat, moving parts, at times being filled with molten plastics, the weight of molds, and electrical hazards. Each of these hazards requires a degree of awareness and caution that the operator must deal with to avoid accidents. Safety instruction for these hazards will be dealt with in the section on basic equipment precautions for plastics machines. In the school laboratory, the use of the machine shop laboratory and woodworking laboratory to support the mold and tooling of the plastics program causes the teacher to include the safety education in these areas. To support this aspect refer for details on machines to Section VI--Equipment/Major Appliances.

BASIC EQUIPMENT PRECAUTIONS

1. Be sure that safety guards on the press are in place and operating properly.
2. Make certain that time cycling, temperature control and adjustment, and press operation are done under supervision.
3. Keep all tripping devices and safety guards in place, and check them for proper functioning before using these machines.
4. Handle hot molds and plastics with heat resistant gloves.
5. Provide warning signs and protection at each heating unit.
6. When using wood and/or metal working equipment, follow the safety rules for those machines.

7. Clean up the area and return all equipment and tools to their proper place of storage. Dispose of all flammable waste material.
8. Avoid handling electrical devices with wet hands or while standing on wet floors.
9. Follow the manufacturer's instructions for operating each machine.

VENTILATION (OSHA)

A spray booth, vapor ventilation booth, and dust collection system must be provided in the laboratory design so the harmful elements will be moved away from the workers. If the conditions are such that the workers cannot be protected with the general area ventilation system, they will need to use personal devices such as dust masks and respirators. (Refer to Section XI and Section XII.)

BASIC VENTILATION PRECAUTIONS

1. Make certain that all grinding and finishing operations on cured plastic products are done in down-draft ventilated areas.
2. Conduct the curing of epoxy and similar resins in the exhaust hood ventilated area.
3. Use the proper ventilation, as toxic vapors may be given off.
4. Position oneself so that vapors or mists are not drawn past the face and the hood does not interfere with the work being done.
5. Locate polyurethane operations properly. Whether they are large-scale bun foaming, froth, pour-in-place lines, or spray systems, these operations almost always require local exhaust systems to prevent the isocyanates from exceeding the safe limit.
6. Keep hoods as close to the process as possible.
7. Wear approved respirators wherever the ventilation is not adequate.
8. Store all respirators in a clean, dry place (use a carton or plastic bag) and preferably in a cabinet or locker designated for this purpose.

FIRE SAFETY (OSHA)

The possibility of fire and explosion has to be considered when working with chemical agents, solvents with low flash points, and cured materials that are very flammable. (See the chemical section of the manual for detailed information on the commonly used chemicals in the plastics programs.)

The general precautions include the storage arrangements for the materials, the transfer of materials from bulk to laboratory containers, and the type of container to be used.

BASIC FIRE PRECAUTIONS

1. Never intermix any substances unless the reactions that might be caused by the mixture are understood.
2. Mix catalysts and resins under supervision. Incorrect mixtures may be explosive or constitute a fire hazard.
3. Avoid spilling solvents. Vapors may flow along the floor, become ignited, and flash back; thus causing serious burns.
4. Keep synthetic materials away from open flames.
5. Use extra precautions when welding in an area that is used for the processing of plastics materials.
6. Keep materials with low flash points under refrigeration.
7. Store all flammables in proper containers and label them in the proper manner.
8. Control the storage of flammables by putting the approved quantity in an approved container.
9. Store waste and residue in covered metal receptacles and dispose of them daily.
10. See that all electrical equipment in the spray areas is an explosion-proof type, approved for use in a hazardous location.
11. Take from storage only the amount of flammable solvent that will need to be used in the work areas.
12. Maintain fire extinguishers in fully operable condition, mounted on hangers, and conspicuously located.
13. Service fire extinguishers at least once a year and date them as to service.

PERSONAL PROTECTION (OSHA)

People working in a plastics need protective equipment and materials to protect themselves. Many of the materials used in plastics operations will cause dermatitis when they come in contact with the skin. Respiratory, nose, and throat irritation; headache; nausea; intestinal upsets; and other conditions may result from breathing the vapors or dust from the various manufacturing processes. Eye protection is needed to avoid

chemical splash, physical harm that might occur when sanding, or injuries from other mechanical means that might cause particles to be forcibly removed into the air. It is also needed to keep out any vapors that might be present. Protective clothing should be used to prevent chemical burns or toxic reaction in case of skin contact with the resin and solvent, or contact with hot materials. (Refer to Section X.)

BASIC PERSONAL PROTECTION PRECAUTIONS

1. Make sure that all respirators fit properly. Watch out for facial hair and eyeglasses that might cause improper fitting.
2. Wear only the approved respirators.
3. Wear a dust mask while sanding fiberglass on the machine sander.
4. Watch for the itching that may occur due to working around or with glass fabrics. It is best to ignore it, if possible, or wash the skin immediately with soap and water; scratching will push the glass particles deeper into the skin and cause further irritation. Do not use compressed air for cleaning the skin or clothing as the air will also drive the glass particles into the skin.
5. Do not rub the eyes while working with a catalyst. Getting this chemical into the eyes can lead to severe eye damage and eventually blindness.

DISPOSAL OF MATERIALS (OSHA)

Disposal of materials used in the plastics programs can be a safety hazard if proper procedures are not used. In general, the problems include contamination of peroxides, solvent, elimination of liquid waste, solid waste that is non-degradable, and the rendering containers to a safe state for disposal or reuse. (Refer to Section XIII--Chemicals.)

BASIC DISPOSAL PRECAUTIONS

1. Isocyanate clings to container walls and, if sealed, can react with trapped water vapor to release enough carbon dioxide to explosively rupture the container.
2. Static electricity buildup should be prevented when transferring solvent from a drum to a container. This is done by grounding the drum and container to form an electrical bond.
3. Peroxide solutions should not be diluted. Using the wrong solvent, or a contaminated solvent, can cause a violent reaction.
4. Containers must be completely emptied and cleaned before disposal.
5. Organic peroxides must be stored apart from all other materials.

6. The disposal of organic peroxides by dumping them in sewers or drains can cause distant explosions.
7. Spilled liquid or paste peroxides should be soaked up with sand, clay, perlite, or vermiculite, and then wet with water.
8. Peroxides disposal should follow the recommendations contained in Section XIII - Chemicals.
9. One should always follow the plant's/school's disposal procedures carefully.
10. Disposable paper should be spread on the workbenches and floor around the working area. It should be replaced as soon as it is soiled.
11. Clean rags should be used and discarded as soon as soiled. They must be put in covered metal containers.
12. Used or dried plastic and other combustible waste products should be placed in covered metal containers.

HEALTH HAZARDS (OSHA)

The health hazards in plastics work are: dust pollution, noise pollution, exposure to vapor, and skin exposure that produces not only mild irritation but can go all the way to actual damage to the body tissues. The more severe hazards involve the effects on the central nervous system and the possible serious damage to the blood, liver, kidneys, and gastrointestinal system. These are hazards that require extreme precautions.

BASIC HEALTH HAZARDS PRECAUTIONS

1. Some materials, such as vinyl chloride, are regarded as a carcinogen. They should be handled carefully.
2. Process solvents should not be used to clean the hands. They remove the natural skin oils and can lead to dermatitis or be absorbed through the skin.
3. Smoking or the use of open flame in any foaming or storage area is prohibited.
4. A person with a medical history of breathing problems or allergies should not be exposed to foam components.
5. Sensitization is an allergic reaction that may occur at any time one is working with isocyanates, even after years of exposure without any reaction. Once one is sensitized, contact with even the smallest amount can cause a severe reaction. This might take the form of a severe allergic or asthma-like reaction of the lungs.

6. The vapors of some catalysts can also cause vision problems.
7. If large amounts of chemicals are splashed on the body, one should rush to a safety shower or flush the body with a hose. The contaminated clothing and shoes should be removed while under the shower.
8. Contaminated clothing and shoes should not be worn until decontaminated or laundered.
9. The only sure way to prevent dermatitis is to avoid contact with chemical irritants.

PLASTICS SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

GENERAL PLASTICS LABORATORY

1. Wear eye protection: _____.
 - A. when mixing resins and catalysts or hardeners.
 - B. when using the machines.
 - C. when power sanding or grinding cured resins.
 - C. when doing all of the above.
2. Wear proper protective _____ for the job being done.
3. Work with tools, equipment, and machines only after having received the necessary safety _____.
4. Obtain _____ when handling heavy or large objects or materials.

MATERIALS

- ____ 1. Resins and catalysts should be kept away from:
 - A. fire and flame.
 - B. boiling water.
 - C. refrigerators used for food storage.
 - D. all of the above.
- ____ 2. Resin and catalyst should be mixed:
 - A. resin to catalyst.
 - B. catalyst to resin.
 - C. either way.
- ____ 3. Chemicals should be used only from containers that are:
 - A. identified by smelling the contents.
 - B. labeled with the contents.
 - C. permitted by the supervisors.
 - C. both B and C.
- ____ 4. During the curing cycle of some resins:
 - A. vapors and gases are developed.
 - B. heat can build up in the material.
 - C. the resins can be very corrosive to the container in which the reaction is taking place.
 - D. all of the above will happen.

EQUIPMENT

1. Pressure molding equipment has the possibility of: _____
 - A. exploding.
 - B. smashing the fingers.
 - C. injuring helpers or those individuals watching.
 - D. doing all of the above.
2. The handling of _____ devices with wet hands or while standing on wet floors should be avoided.
3. Hot molds and plastics must be handled with head resistant _____.
4. The safe operational approach to any equipment includes: _____
 - A. the use of all safety guards placed on the machine.
 - B. proper, posted warning signs.
 - C. proper housecleaning of the area around the machines.
 - D. all of these.

VENTILATION

- ____ 1. Adequate ventilation should be provided when using:
- A. resins and hardeners.
 - B. solvents.
 - C. both A and B.
 - D. none of the above.
- ____ 2. Ventilation is important because:
- A. individuals may be overcome by fumes.
 - B. resins smell badly.
 - C. it cuts the drying times.
 - D. it does all of the above.
- ____ 3. When considering proper ventilation principles, one should remember that:
- A. sanding should be done in a down-draft ventilated area.
 - B. hoods work best if they are as close to the process as possible.
 - C. respirators should be used when ventilation of any area is not adequate.
 - D. all of the above are true statements.

FIRE SAFETY

1. Rags containing resins, solvent, and other combustibles should be: _____
- A. left on the work bench.
 - B. thrown on the floor.
 - C. placed in an approved metal container.
2. Flammable liquids should be stored in a room or cabinet that is _____.
3. Incorrect mixtures may be explosive or constitute a _____ hazard.
4. Fire extinguishers shall be serviced at least once a _____ and dated as to service.
5. Materials with low flash points should be kept under _____.

PERSONAL PROTECTION

- _____ 1. When using synthetic materials, resins, curing agents, solvents, and catalysts, individuals should protect their hands and clothing by using:
 - A. rubber or plastic gloves.
 - B. aprons or old clothes.
 - C. hand cream on the hands.
 - D. all of the above.
- _____ 2. When sanding or filing resin, one should:
 - A. use a respirator or dust mask.
 - B. use nothing, as it is not harmful to the nose or lungs.
 - C. take care to see that sanding is done outside.
- _____ 3. When itching occurs because of working with glass fabrics, one should:
 - A. scratch the skin in order to remove the particles.
 - B. ignore it, if possible.
 - C. wash the skin with soap and water.
 - D. do both B and C.
- _____ 4. Eye protection must be worn when using resins and hardeners because they may:
 - A. damage the eyes.
 - B. cause blindness.
 - C. do both A and B.
 - D. cause redness of the eyes.

HEALTH HAZARDS

1. _____ is one of the plastic materials regarded as a carcinogen. Since it is commonly used to make several products, caution has to be exercised in the processes using this resin.
2. The only sure way to prevent dermatitis is to avoid contact with _____ irritants.
3. Never _____ or use an open flame in any foaming or storage area.

DISPOSAL OF MATERIALS

1. Heavy paper or cardboard may be used to: _____
 - A. protect the work area.
 - B. protect the bench tops.
 - C. clean up the area after it dries.
 - D. do both A and B.
2. Fiberglass resins and fibers may damage clothing and containers; therefore: _____
 - A. disposable containers should be used.
 - B. aprons, shop coats, or old clothes should be used.
 - C. both A and B.
 - D. just A should be used as resin may be washed from the clothing
3. _____ of solvents can cause a violent reaction.
4. Peroxides can safely be destroyed, but one should not do which of the following: _____
 - A. burn them in small amounts in an open trench.
 - B. slowly add them to a 5% caustic solution.
 - C. pour them down a sink drain.
 - D. bury them.

TEST KEY

GENERAL PLASTICS LABOARTORY:

1. D
2. Clothing
3. Instruction
4. Help

MATERIALS:

1. D
2. B
3. B
4. D

EQUIPMENT:

1. D
2. Electrical
3. Gloves
4. D

VENTILATION:

1. C
2. D
3. D

FIRE SAFETY

1. C
2. Flame-proof
3. Fire
4. Year
5. Refrigeration

PERSONAL PROTECTION:

1. D
2. A
3. D
4. C

HEALTH HAZARDS:

1. Vinyl chloride
2. Chemical
3. Smoke

DISPOSAL OF MATERIALS:

1. D
2. C
3. Contamination
4. C

REFERENCES

Materials were selected and reviewed from the following sources, and in some instances were incorporated in the production of the preceding unit.

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14. Safety Recommendations & UOSHA Standards. Utah State Board of Education.

15. Swanson, Robert S., Plastics Technology, McKnight & McKnight, 1965
16. Woodard, Robert Lee, Safety Instruction in Industrial Arts Education. California State Department of Education, 1955
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SMALL ENGINES

1. The small engines laboratory shall have a minimum work area of 80 square feet per pupil, an adequate work area of 100 square feet per pupil, or a desired work area of 125 square feet per pupil.
2. Small engines are not to be operated at the school, either inside the laboratory or outside on the shop apron, without the following precautions:
 - A. Obtain the teacher's permission to start any engine.
 - B. If the engine is to be started and operated inside the lab, the muffler discharge must be fastened to a proper exhaust ventillator. Be sure the exhaust fan is turned on.
 - C. Have a portable fire extinguisher handy. This must be either a carbon dioxide or a dry chemical type.
 - D. Place the air cleaner in position on the carburetor. This reduces the danger of a backfire.
 - E. Secure the engine to the floor or to a suitable fixture, if possible.
 - F. Do not prime the carburetor with an open can of gasoline. Use a primer can and place it well away from the engine when it is not in use.
 - G. Do not prime the carburetor while turning the crankshaft. Inject fuel only when the engine is at rest.
 - H. Keep hands and feet clear of the flywheel, power take-off pulley or mower blade, spark plug, and the hot exhaust system.
 - I. Do not leave a running engine unattended.
 - J. Shut the engine off immediately if an unusual noise or vibration occurs.
 - K. Shut the engine off immediately if the engine speed increases without control.
3. Observe eye safety rules at all times.
4. Wipe up all oil and grease spills immediately.

SMALL ENGINES GENERAL SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

- _____ 1. The air cleaner must be in place while starting the small engine because:
- A. it reduces the danger of backfire.
 - B. the shop air is dirty.
 - C. it helps to choke the carburetor.
 - D. the teacher said it should be done.
- _____ 2. After the engine has started and is running, one should adjust the carburetor mixture screws. However, a screwdriver is not handy. The mechanic will:
- A. slow the engine to idle and quickly get the tool.
 - B. call a classmate to bring a screwdriver.
 - C. stop the engine and get the necessary tool.
 - D. try to adjust the carburetor with any available tool that might work.
- _____ 3. The carburetor can be safely primed only by:
- A. pouring a small amount of gasoline in it while cranking the engine.
 - B. pouring a small amount of gasoline in it while the engine is at rest.
 - C. squirting a small amount of gasoline from a primer can while cranking the engine.
 - D. squirting a small amount of gasoline from a primer can while the engine is at rest.
- _____ 4. If a knock is heard in the engine, one should:
- A. shut it off immediately and notify the teacher.
 - B. slow it down and see if the knock continues.
 - C. increase the engine speed to see if the knock continues.
 - D. shut it off immediately and restart it to see if the knock continues.

- _____ 5. Safety glasses must be worn:
- A. while starting an engine.
 - B. when grinding metal.
 - C. when priming the engine.
 - D. all the time that one is working in the shop.
 - E. during all of the above.
- _____ 6. An engine cannot be started in the laboratory unless:
- A. the teacher is out of the room.
 - B. another pupil is helping.
 - C. the teacher gives permission.
 - D. the engine has been tested.
- _____ 7. Keep hands and feet clear of the following parts when starting and operating the small engine:
- A. flywheel, exhaust, carburetor, and pulley.
 - B. flywheel, pulley, blade, and exhaust.
 - C. pulley, blade, crankcase, and exhaust.
 - D. exhaust, spark plug, engine stand, and blade.

WOODS

An important part of wood technology and woodworking in general is learning to use safe practices and procedures that enable the pupils to work without causing injury to themselves or others.

The woodworking laboratory shall have a minimum work area of 80 square feet per pupil, an adequate work area of 100 square feet per pupil, or a desired work area of 125 square feet per pupil.

The following general safety rules are necessary to conduct and maintain a safe working area in a woods laboratory. Some of these rules pertain to federal, state, and local laws and regulations regarding working conditions and are to be made available for pupils to study and follow.

1. Protective equipment, including personal protective equipment for the eyes, face, head, and extremities, protective clothing, respiratory devices, protective shields and barriers are to be provided, used, and maintained according to the hazards that are present. (OSHA)
2. Suitable eye protectors are to be provided and utilized where machines or operations present the hazard of flying objects, glare, liquids, etc. (OSHA)
3. Storage areas are required to be kept clear of materials that constitute hazards from fire, explosion, tripping, or pest harborage. (OSHA)
4. Aisles and passageways are required to be kept clear and in good repair with no obstruction in or across the aisles that would create a hazard. (OSHA)
5. Combustible waste and residue in a building or operating unit must be kept in metal waste containers with metal lids. (OSHA)
6. Supplemental records of recordable occupational injuries and illnesses should be maintained in detail. (OSHA)
7. No horseplay will ever be allowed inside the shop, whether the work has started or not.
8. Tools that are not in perfect working condition should not be used. They should be reported and not used until repaired.

9. When another person is using a machine, one should never talk to him/her, as this may distract his/her attention and cause an accident.
10. All tools which have sharp points or cutting edges should be carried so that the points or edges are protected and will not hurt the carrier or any other person.
11. Running in the shop is not allowed.
12. All small objects must be kept out of the mouth. Nails, screws, rivets, etc. should not be held in the mouth, as this is a dangerous practice.
13. The hands should always be washed after working in the laboratory.
14. Shirt cuffs must be kept buttoned or rolled above the elbows. The cuffs should never be rolled just one or two turns, as this causes them to be loose, and they might catch in the machinery.
15. Outer garments such as sweaters and coats should be removed before working in the laboratory.
16. If dirt or other foreign particles become lodged in the eye, don't rub it. This will cause the object to be more deeply imbedded.
17. All projects should be stored in a designated place. This will prevent the leaving of projects where they will fall or contribute to an accident.
18. All scraps and small pieces must be cleaned off the floor.
19. A bench top should never be brushed off with the bare hands. A bench brush should be used to prevent hurting the hand by hitting splinters.
20. Any unsafe practices that are observed in the laboratory should be reported.
21. The pupil should work at his/her own assigned area and never crowd too closely to another worker.
22. An apron should be worn while working in the laboratory. The apron not only protects the worker's clothing from dirt but helps to keep the loose ends of clothing out of the machines.
23. All accidents, no matter how small, should be reported immediately, so that first aid can be given.

24. Long hair is dangerous when working around machines. The hair should either be cut short or a cap be worn to keep it out of the machines.
25. Jewelry, such as wristwatches or rings, can be dangerous. They should be removed before going to work on machines. Watches and rings should not be left where they might be stolen or broken. They can catch in the machinery, and rings can be smashed on the finger.
26. Safe habits should be practiced at all times. This helps one become a careful craftsman and not a sorry one.
27. Power machines may be used only after the pupil has been qualified through meeting the requirements set by the teacher and then only with the teacher's permission.

WOODWORKING SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

(Circle true or false)

- | | | |
|---|---|---|
| 1. When doing your planning at your bench, it is not necessary to wear safety glasses. | T | F |
| 2. A special metal container with a lid is used to dispose of combustible waste. | T | F |
| 3. All accidents should be reported to the instructor no matter how minor. | T | F |
| 4. All cutting tools must be kept sharp and with proper set for best use. | T | F |
| 5. It is all right to ask questions of another student operating a machine if it applies to use of machine. | T | F |
| 6. Small objects such as nails and screws are easier to keep track of if you put them in your mouth. | T | F |
| 7. It is not necessary to pick up small scraps from the floor until the end of each working day. | T | F |
| 8. Use a bench brush to brush off bench tops instead of your hand. | T | F |
| 9. Long shirt sleeves must be rolled up above your elbows before going to work. | T | F |
| 10. Do your playing and messing before class starts to work. | T | F |
| 11. All jewelry such as rings, watches, bracelets and necklaces should be removed before going to work. | T | F |

Woodworking Safety Quiz (continued)

(Circle true or false)

- | | | |
|---|---|---|
| 12. Don't tell the instructor if you see a fellow student doing something that is unsafe or he will get into trouble. | T | F |
| 13. A proper fitting apron is a good safety practice. | T | F |
| 14. Long hair should be covered or tied back when operating power machines. | T | F |
| 15. All the safety rules and guards in the shop are not of any use, unless you follow instructions and use them. | T | F |

Key:

- 1. F
- 2. T
- 3. T
- 4. T
- 5. F
- 6. F
- 7. F
- 8. T
- 9. T
- 10. F
- 11. T
- 12. F
- 13. T
- 14. T
- 15. T

LANGUAGE ARTS - DRAMA

STAGE MOVEMENT

Stage movement is an integral part of the total performance of a dramatic production. When the director stages a physical fight scene or an action requiring exceptional physical prowess or energy, he must always be aware of the strain on the actor. Physical exercises to tone muscles and release tensions should be a part of the drama program. Rehearsing and rehearsing of well-planned movement will show the audience a more believable character and prevent many actors from developing sore muscles or sustaining bodily injury.

DIETING FOR ASSUMING AN ACTING ROLE

Dieting for weight control should be planned with the consent of the pupil's parents. Performing a role on stage is an excellent incentive to trim down weight and increase physical fitness and attractiveness.

MAKEUP

While the physical appearance of the actors may be of major concern to directors in casting and producing plays, many makeup ingredients such as hair dyes, hair sprays, and cosmetics may cause toxic reaction to the actor. Pupils and their parents must be consulted as to allergies or known toxic reactions to makeup ingredients before any are applied. If a rash, watery eyes, runny nose, or any other sign of toxic reaction should occur, the makeup should be removed with warm water and professional help should be sought. Special non-allergic makeup products can be purchased from several companies such as Stein or Max Factor.

REHEARSALS

Rehearsal periods, or the times before and after them, are prime times for accidents. Therefore, pupils must be closely supervised. Each rehearsal must be approached in a professional manner in order to prevent mayhem. Horseplay must not be tolerated. A well-planned routine must be established, and the pupils must know exactly what is expected of them.

CLASSROOM ACTIVITIES

AUDIENCE

MEANS OF EGRESS--The comfort of the members of the audience is a prime concern, but their safety is essential. Safety codes for seating shall be strictly followed, enabling an audience to disperse in case of an emergency from at least two clearly-marked exits which are remote from each other. Entrances and exits must be free from all obstructions, including scenery, props, costumes, or persons. The exits must be appropriately marked with visible signs. Ways of exit travel shall be posted or conspicuously indicated where exits are not clearly visible.

DOORWAYS AND PASSAGEWAYS--Doorways and passageways which do not lead to an exit or a way to reach an exit but which might be mistaken for an exit, shall be arranged or marked so that they are not mistaken as exits.

SEATING--All persons must be seated in regular, fixed seats. No one is allowed to sit or stand in the aisles.

HOUSE MANAGEMENT--Ushers and house managers shall have flashlights with them during the performances. In an emergency which requires the audience to clear the room, the ushers are to open wide all the exit doors. If necessary, they should use their flashlights to help call attention to announcements. The director-teacher has the responsibility for devising a plan which will use several, alternate emergency evacuation routes and also for designating a chain of command. Planning beforehand is the key to preventing panic.

HAZARDS IN SEATING--Extra care should be taken when seating the audience on levels or risers. In order to prevent falls, toeboards or over-lips must be used. These will keep the chairs from sliding off in any direction and will also prevent them from falling into cracks between the levels. Aisles, railings, and seating spaces must meet safety codes. Steps must be clearly marked with signs or tape.

LIGHTING--Audiences are aware only of the special stage effects created by stage lighting. The teacher-director shall be concerned with electrical safety which dictates the following:

1. Extension cords must be safely taped down or up, whichever is feasible.
2. No circuit overload shall be allowed to occur.
3. Dimmers must be well within their load capacities.
4. No make-shift electrical wiring shall be used.
5. All lighting instruments shall be securely mounted.

6. All lighting instruments must be kept clear of curtains, costumes or other flammables.
7. Emergency lights must always be available.
8. Flexible cord shall be used only in continuous lengths, without splice or tape.
9. Each outlet box or receptacle shall be provided with a cover or fixed canopy.

PROPS AND COSTUMES

EDIBLE PROPS--Food to be eaten on stage must be stored in an appropriate container. Many actors have suffered through the effects of spoiled milk or salad dressing because the food was not refrigerated. Practical jokers are also inclined to add a little something to the edibles on stage, just for a laugh.

HAZARDOUS PROPS--Dangerous props such as knives, swords, or fire-arms should not be used on stage. If real weapons must be used, the sharp edges should be covered with tape to prevent cutting. If fire-arms are used, the firing pin must be removed even if it is not aimed or fired on stage. If a prop is deemed "practical" in a script, it is not to be a fake piece. A "practical" tree stump is one on which an actor can stand or sit and must be built to bear his weight. All "practical" props must be carefully tested and tried before used on stage.

COSTUMES--For obvious health reasons, costumes should be washed before and after each use in a production. If this is not possible, they should be fumigated. Shoes, boots, and hats must also be sprayed or powdered with a disinfectant. Care should be taken to avoid the use of flammable or toxic fabrics in the construction of costumes or props.

SCENERY

CURTAINS--Flammable curtains or other materials such as straw, hay, grass, or paper shall be treated with flame-proof solutions before being used in scenery construction.

SECURING SCENERY--The footing or hanging of scenery must be secure enough to prevent any danger of slipping, falling, or the displacement of any part.

RISERS--Levels and platforms shall be well tested before being used. Guardrails and toeboards must be installed on all open sides and ends of platforms which are more than four feet above the floor.

STAGE PERFORMANCES

SEATING CAPACITY

The seating capacities of auditoriums and gymnasiums are regulated by building codes. Fire marshals, who frequently visit performances, have the authority to close a performance for violations of safety codes.

PORTABLE SEATING

If any change in seating is being considered, the local fire marshal shall be consulted. No temporary seating is allowed in entrances, exits, or aisles. This includes standing or sitting on the floor. Guardrails and toeboards must be installed on all open sides and ends of seating platforms which are more than four feet above the floor.

EMERGENCY PROCEDURE

A concise chain of command is essential in dealing with any emergencies. Several variables must be considered during a stage performance, and each one should be carefully planned for with possible alternative options. In most schools, the administration has various procedures to be followed in case of fire or in tornado emergencies. The teacher-director must often act with decisiveness, without the aid of consultation, during a performance. The teacher and principal must have various plans of action worked out in advance, including possible emergencies arising in the audience, backstage, onstage, or in the foyer. In all instances, panic must be avoided. Leaving an audience in a dark theatre, without any knowledge of what is happening, can be catastrophic. Any kind of disturbance in the audience can be better dealt with when the house lights are up and the curtain is down.

FIRE PROCEDURE

Review and refer to Section XIV, Fire Protection.

ILLNESS OR ACCIDENT PROCEDURE

In the event of illness or accident, follow the procedure listed below.

1. Administer first aid, if possible.

2. If the injury is serious, do not move the injured person. Notify health services. If none are available, call for emergency help.
3. If a serious illness occurs in the audience, turn on the house lights and lower the curtain.
4. If a serious illness occurs to a pupil, notify the parents.
5. Notify the school administration of all illnesses or accidents.

POWER FAILURE PROCEDURE

Should a power failure occur, follow the procedure outlined below:

1. Turn on the emergency lights, generators, battery-operated spotlights, or flashlights. An alternate power source must be available during nighttime performances.
2. Inform the audience of the problem and ask them to remain seated until the power is restored.
3. Call the local electric company to determine, if possible, the duration or cause of the failure.
4. Notify the school authorities.

TORNADO PROCEDURE

The audience should be informed of any tornado sightings or warnings issued during a performance. In case a tornado disturbance occurs, follow procedures outlines in BOE and school policies. If an injury, fire, or power failure occurs, proceed as previously discussed.

EXITS

Be sure all exit lights are on and clearly visible and that no exit is locked or blocked. Refer to Section XIV, Fire Protection.

LIGHTING

A light check shall be made before each performance to be sure all the stage lighting instruments are in safe working condition.

STAGECRAFT

EXTENSION CORDS

Flexible cords shall be used only in continuous lengths without a splice. If any break in the insulation occurs, the extension cord shall be removed from service and replaced. If makeshift electrical cords are needed to extend the stage lighting equipment, they should be placed by a qualified electrician. Refer to Section VII, Portable Power Equipment.

FIRST AID

A first aid kit shall be conveniently placed backstage, in the scenecraft shop or wherever stage construction takes place. Persons working backstage should have a recent tetanus shot or booster. All injuries must be reported to the school health services or the administration as soon as possible. Refer to Section IV, Emergency Action.

FLAMMABLE AND COMBUSTIBLE MATERIALS

Flammable and combustible materials shall not be used unless the storage and work areas are equipped to dispense, store, or discard these combustible materials. Refer to Section XII, Hazardous Materials.

USE OF TOOLS

A check-out system shall be devised in order to keep tools in safe storage places and in good working condition. Hand-held power tools shall be regularly inspected for damage to items such as cords, blades, or bits. The use of a well-organized tool carryall or box on wheels will prevent injuries. Refer to Section VII, Portable Power Equipment and Section VIII, Hand Held Tools and Utensils.

PERSONAL PROTECTION

Before operating power tools the operator must remove jewelry, confine long hair, and replace loose clothing which may catch in the equipment or hamper the safe operation of the tools. Suitable eye protectors shall be worn whenever there is a hazard such as sawdust or flying objects. Air filter masks shall be worn when working with dry scene paint, whitening or wheat paste, to avoid inhaling the dust particles. All persons using stage areas are required to wear shoes.

STEPLADDERS

WOOD LADDERS -- A person wearing a safety hat must hold all A-frame ladders while they are being used. Ladders should be inspected regularly for broken or weak steps, rungs, or cleats. If found to be in defective condition, they shall be immediately repaired or discarded. Only OSHA approved ladders will be purchased.

METAL LADDERS -- Metal stepladders must be fitted with non-slip material and inspected regularly for metal fatigue. Metal ladders shall not be used as a light tower by bolting spotlights, work lights, or backing lights to them. Only OSHA approved ladders will be purchased. Refer to Section XV, School Facilities.

PAINTS

Latex, tempera, or water base scene paint shall be used on scenery or stage props. This eliminates the use of flammable liquids in painting.

POWER TOOLS

The school holds the responsibility for ensuring that all tools and equipment are in safe working condition, even if they are owned by the pupil or teacher. (OSHA) No person shall operate power tools unless he or she has been given thorough instructions and has passed safety tests for each tool used. Protective devices (hoods, spreaders, and non-kickback finger and safety guards) must be in operation on all power equipment such as radial-arm, table, band, gig, or scroll saws. All power tools must be effectively grounded. Consult Section VI-- Equipment/Major Appliances.

STORAGE

ORGANIZATION

The use of lumber, costumes, scenery, props, lighting equipment, tools, and materials are a necessary part of stagecraft. If ample storage space is not available, these materials must be kept to a minimum. A practical solution is to store them in areas organized for each category and then keep them orderly. Stage materials and props should be securely stacked, racked, and limited in height so they are stable and secure.

AISLES AND PASSAGES

Storage aisles and passageways shall be kept clear and in good repair with no obstructions which could create a hazard.

PEST HARBORAGE

Metal or plastic cans shall be used to store props or set pieces made of papier-mache. This prevents pest harborage.

WOODWORKING

CIRCULAR SAWS

Circular saws shall be equipped with the following protective devices:

1. A guard that completely encloses that portion of the saw above the table and the material being cut.
2. A spreader to prevent material from squeezing the blade.
3. Non-kickback fingers or dogs to prevent material from being thrown back at the operator. Refer to Section VI Equipment/Major Appliances.

RADIAL SAWS

Radial saws, in addition to the upper hood, are required to be equipped with a LOWER GUARD to cover the lower, exposed portion of the blade. An adjustable stop is required on radial saws to prevent the forward travel of the blade beyond the position necessary to complete the cut. Non-kickback fingers or dogs are required for radial saws that are for ripping. Radial saws are required to be installed in such a manner that the front end of the unit will be slightly higher than the rear so the cutting load will return gently to the starting position when released by the operator. Refer to Section VI, Equipment/Major Appliances.

BAND SAWS

All portions of the saw blade must be covered except at the point of operation. Refer to Section VI, Equipment/Major Appliances.

BELT SANDING MACHINES

Belt sanding machines must be equipped with guards at each nip point where the sanding belt runs on to a drum. Refer to Section VI, Equipment/Major Appliances and Section VII, Portable Power Equipment.

HOT GLUE GUNS

Hot glue guns are to be used with extreme care and disconnected immediately after use.

All pupils should be instructed and tested in stagecraft procedures. Teachers can use the following test as an example. Pupils' completed tests must be kept on file.

STAGECRAFT SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

- _____ 1. To prevent fire or smoke from entering the house one should release the:
 - A. smoke pockets.
 - B. asbestos curtain.
 - C. cyc curtain.
- _____ 2. To maintain equal balance of weights on battens, the cradle should:
 - A. be weighted equal to the batten load.
 - B. have its ropes tightened at the bottom sheave.
 - C. have its pin rail locked at all times.
- _____ 3. To keep the battens from voluntarily coming in, keep:
 - A. the ring locks on.
 - B. the cradle weights in.
 - C. the endless ropes tied off.
- _____ 4. To protect the actors and stage crew from fumes, smoke, or dust, one should release:
 - A. the lock railing.
 - B. the smoke pockets.
 - C. the fire curtain.
- _____ 5. To balance a special or single rope, always attach:
 - A. a multiple pulley.
 - B. a stageweight.
 - C. a sandbag.

- _____ 6. To insure the safety lineman, call: "Batten in." to notify crews of:
- A. jackknives.
 - B. pivot anchors.
 - C. battens flying.
- _____ 7. To safeguard everyone's well-being backstage and on stage, all crew persons must refrain from:
- A. eating backstage.
 - B. horseplay.
 - C. telling bad jokes.
- _____ 8. To prevent personal injury, one does not necessarily have to:
- A. wear shoes.
 - B. tie back long hair.
 - C. wear dark clothing.
- _____ 9. To prevent anyone from falling into an open trap:
- A. a stage manager yells, "Trap open."
 - B. a barricade should be set up.
 - C. a crew person should always look where he's going.
- _____ 10. To remind people not to smoke backstage will help:
- A. prevent people from smoking too much.
 - B. lessen the danger of fire.
 - C. keep the smoke from going on stage.
- _____ 11. To rig up special effects to be used on stage during a performance, great care should be taken to avoid injuries by:
- A. rehearsing often.
 - B. keeping out of the way.
 - C. planning activities carefully.
- _____ 12. To extinguish a small fire, one should not only know where a fire extinguisher is located but also:
- A. where all extinguishers are located.
 - B. which kind to use.
 - C. how to operate it.

- ____ 13. To make scene glue in a double boiler, one must remember:
- A. that an electric hot plate must be turned off.
 - B. to use one part glue and one part whiting.
 - C. that cold water glues are a fire hazard.
- ____ 14. To load the counterweights and prevent anyone from being hit with falling weights, the stage manager or safety person:
- A. clears everyone from the area.
 - B. calls in a loud voice, "Watch out."
 - C. looks out for all crew persons.
- ____ 15. To insure safety for anyone climbing on an A-frame ladder, it is advisable:
- A. to have only one person at a time climb up.
 - B. to have someone hold the ladder.
 - C. that the wheels be locked.
- ____ 16. To protect one's eyes from dangerous matter, goggles should be worn when:
- A. using the hand drill.
 - B. cutting wood.
 - C. sweeping the floor.
- ____ 17. To prevent accidents when using firearms as stage props, one should be absolutely sure that:
- A. only blanks are used.
 - B. the firing pin has been removed.
 - C. the cartridge chamber is empty before each performance.
- ____ 18. To be safe, all flash pots should be loaded:
- A. with fresh powder
 - B. by an expert electrician.
 - C. by someone wearing rubber gloves.
- ____ 19. To be sure a prop or set piece is "practical" for use on stage, it must:
- A. be painted with latex paint.
 - B. be fireproofed.
 - C. bear the weight of the largest actor.

- ____ 20. An untidy prop or costume room indicates:
- A. a poorly organized crew.
 - B. a major fire hazard.
 - C. a director who is inefficient.
- ____ 21. To protect against serious infection, a tetanus shot should be required of:
- A. everyone who used the back stage areas.
 - B. all crew members.
 - C. the stage manager and director.
- ____ 22. Being able to see backstage is not the only purpose of work lights. They also provide:
- A. a method of control.
 - B. a good feeling of security.
 - C. less chance of accidents.
- ____ 23. List the procedure for flying scenery battens:
- A. _____
 - B. _____
 - C. _____

PHYSICAL EDUCATION, INTRAMURALS, AND ATHLETICS

The subject of safety in physical education and athletics is extremely broad and complex. It must be recognized that no single book can completely cover all phases or all areas of such a wide range of issues and topics. The following items related to safety in physical education and athletics should serve as a guide and springboard for teachers and administrators as they consider the multiple facets for their special concerns.

With respect to competitive athletics, it must be understood that the rule book for a given sport will specify certain safety equipment items; i.e., mats, headgear, landing pits, etc. State activities associations require all participants in interscholastic athletics to have on file in the school office a physical examination report signed by a licensed physician, as well as by the parent/guardian. Safety concerns that are covered by the rule book or state association must be complied with and are not detailed in the following article.

The underlying premise of this unit is to make the reader "safety-conscious" and inspire him/her to "think safety" in all future actions.

CHECKLIST FOR PHYSICAL EDUCATION, INTRAMURALS, AND ATHLETICS

SECURE ATTACHMENTS-- Fastening pins, hinges, nuts and bolts, welding, cables and anchors, and wood and cement bonds should be periodically checked.

STORAGE PRACTICES-- Equipment that is improperly stored may collapse, trip players, or dangerously protrude. Damaged equipment may make a physical education activity risky. One should be aware of splinters, sharp metal, and worn-out supporting elements.

ELECTRONIC SAFETY-- Electronic wiring must be examined to assure its safe use. Whirlpool tubs, scoreboards, pace clocks and video-tape equipment are examples of commonly-used electrical devices. Use an emergency "ground fault" receptacle when water is nearby.

CLEAN, DISINFECTED SURFACES-- Health problems are reduced by eliminating bacteria growth in swimming pools, shower and locker rooms, training rooms, wrestling areas, and other likely breeding grounds for microorganisms.

SUPERVISION IN SAFETY-- The teacher and coach have a responsibility to insure reasonable safety during physical education classes, intramurals, and athletic events.

Safety procedures shall be discussed and practiced. Written operating procedures are always appropriate. Pupils who get out of the supervisor's visibility range are rarely supervised properly. Lock-off areas may be an attractive nuisance to pupils when adequate supervision is not available. The entrances to swimming pools, weight rooms, and gymnasiums should be secured when not being utilized for school.

CLOTHING REQUIREMENTS-- Clothing should not hinder movement unnecessarily. Protective apparel (i.e., pads, face and eye guards, and gloves) should be used when applicable. Jewelry is normally dangerous when worn during physical activity. Clothing should afford ventilation and/or insulation when the temperature fluctuates. Improper footwear leads to many unnecessary injuries.

PLAYING AND WORKING SURFACES-- Surfaces should be level and should allow the necessary friction for turning and moving without slipping. Many surfaces should be padded or guarded with mats. The thickness of protective pads should be checked. Surfaces should be given periodic maintenance (i.e., cleaning, mowing, shoveling, grading, sweeping, painting, and sealing).

PROTECTIVE BARRIERS-- Barriers such as backstops and batting cages should afford protection to nonparticipants. Fences often are necessary to keep observers away from many activity areas (i.e., shot put, discus, running tracks, and archery ranges).

SPOTTING TECHNIQUES -- Spotting is necessary in gymnastic activity to keep the body moving on course. Spotters should be strong enough to support the participant. Good communication must exist between the spotters and participants.

OUTDOOR ELEMENTARY PHYSICAL EDUCATION SAFETY

CLIMBERS (JUNGLE GYM, HORIZONTAL BAR, LADDER, ETC.)

1. Frequent examinations of the structure are necessary to assure that the supports remain strong.
2. The pupils must exercise caution when working/hanging from larger diameter bars. Grip efficiency is directly related to the size of the hand and the bar diameter.
3. Pupils should be cautioned to use common sense when engaging in a high risk activity. Spotters are to be used when necessary.

4. Arm and shoulder strength should be increased, through exercise, in order to reduce slips and falls.

SLIDES

1. Only one person, in a sitting position, should slide at one time.
2. Safety hand rails must be used when a pupil is climbing up the ladder.

SWINGS

1. Only one person to each swing seat is to be allowed.
2. All participants should swing in parallel arcs.
3. The swing should be dismounted only after movement has ceased.
4. Seat construction should be of a soft pliable material.

SEESAW (TEETER-TOTTER)

1. Both people should mount and dismount simultaneously.
2. People of equivalent weight should work together.

MERRY-GO-ROUND

1. A person should ride in a low position while holding the safety rail.
2. A rider should get on and off of the merry-go-round only when it is stationary.
3. No one should be allowed to crawl under this equipment.

SOFTBALL AND TEE-BALL

1. All batters will wait behind a well-constructed protective backstop until it is their turn to bat.
2. Swinging bats near other participants is a dangerous practice.
3. Sliding should be discouraged.
4. The bat handles should be taped or treated to increase the grip leverage and prevent "thrown bats."

TRACK AND FIELD

1. A progression of warm-up exercises and conditioning should be used to prepare the participants for a particular activity.
2. Allowance for different physical capacities must be made. Training workouts may vary from one individual to another.
3. Suitable footwear should be used for running.
4. Safe landing techniques for the high jump are to be adopted; especially in the sand pits.
5. The projectiles used in field events should be thrown away from others.

FLAG OR TOUCH FOOTBALL

1. Blocking is forbidden. A "free passing" rule can be adopted to offset the lack of blocking.
2. A person must not leave his/her feet to "touch," grab a flag, or recover a fumble. It may lead to injury.
3. The participants must be effectively conditioned for fast running and quick movements.
4. The playing field should allow good footing and a cushioned landing.
5. No metal or sharp objects that could injure another player should be allowed on clothing.

SOCCER

1. The participants must be physically conditioned for kicking and running.
2. The ball should not be overinflated, as it may cause foot injuries to the beginning player.
3. The instep, rather than the toe, should be used to kick the ball.
4. Players should learn the proper techniques and rules to prevent overly-aggressive play.

RUNNING GAMES

1. The players should work in an open, level, and soft playing surface.

2. The participants must be properly conditioned before sustained and intense work.
3. Participants should wear stable footwear to reduce ankle and leg injuries.

PLAYGROUND

1. Unnecessary sharp and dangerous objects, such as rocks and broken bottles, must not be allowed on the playground.
2. Level surfaces are to be maintained by filling in holes and washed-out areas.
3. The structures of the playground equipment are to be checked periodically to insure strong support.
4. The available play area should not be overcrowded with people, as it makes contact injury likely.
5. Designated areas are to be established for certain activities, such as softball and soccer. Many games require large open areas and special equipment.

INDOOR ELEMENTARY PHYSICAL EDUCATION ACTIVITIES

GYMNASTIC TUMBLING

1. Approved mat surfaces that can absorb the shock during contact and that can fit snugly together are to be used.
2. The participants are to be conditioned for strength, flexibility, and agility movements.
3. The participants will begin with an easy, low-risk movement before progressing to more high-risk movements.
4. The proper spotting techniques will be used when necessary.
5. The participant should rest fatigued muscles before doing high-risk movements.
6. Work away from obstructed areas.
7. Wear clothing that will allow free, unhindered movement.

ROPE CLIMBING

1. The safe and reliable techniques will be used in getting up and down the rope.
2. The arm and shoulder area muscles should be physically conditioned to allow maximum strength utilization.
3. The nonclimbers shall remain at a safe distance from the bottom of the rope.
4. The end knot is to be prevented from swinging freely during the climb.
5. The area under the rope shall be padded with soft mats.
6. Avoid using ropes for swinging, under normal situations.

CARGO NETS

1. The net should be well secured at the bottom to prevent swinging.
2. The number of participants should be governed by the size of the net. Overcrowding leads to accidents.
3. A padded landing area for emergency landings and dismounts will be created.

VAULTING

1. The equipment must be sturdy and padded in order to prevent collision injuries.
2. The proper spotting procedures, especially on high risk vaults, shall be followed.
3. Vaulting is to be done in an open area so that approaches, vaults, and dismounts are unobstructed.

BALANCE BEAM (FOUR-INCH)

1. Beginners will work only with the beam low to the ground.
2. Only one person will work on the beam at any one time.
3. Suitable footwear must be used when working on the beam to allow for proper friction.
4. The beam must be maintained sturdy, level, and free of rough edges.
5. Proper spotting techniques are to be used when appropriate.

RUNNING ACTIVITIES

1. Runners are to have sufficient distance to decelerate before approaching walls and furnishings.
2. Floors will have adequate friction levels to allow for changes in direction and speed.
3. The pupil should choose the best footwear available, to increase traction.
4. The size of the room and the number of participants will affect the intensity and length of the run.

SCOOTERS

1. The pupil shall not stand on a scooter.
2. Clothing is to be worn that will not become entangled in the wheels. Also, the pupil's hands must stay away from the wheels. The pupils must be aware of their positions in relationship to their surroundings.

STRIKING ACTIVITIES

1. Sufficient open space is to be kept between strikers.

2. Eye protective devices shall be used when necessary.
3. High velocity projectiles must not be hit in the direction of unsuspecting individuals.
4. Caution is to be taken so that the striking device is not accidentally released during striking.

SECONDARY PHYSICAL EDUCATION AND INTRAMURALS

ARCHERY

1. The range should be well planned. It must be away from pedestrian access, have a good backstop, and be in an environment where visual and audible control can be used by the supervisor.
2. Proper equipment increases safety. An archer should use arm and hand guards, suitably matched arrows to bow, and feathers attached to arrows.
3. The range supervisor must be able to communicate with all archers.
4. The range supervisor should instruct the archers when to notch the arrow.
5. The shooting line should never be crossed until all shooting has ceased.
6. Equipment that is worn or damaged should be replaced or repaired.

BADMINTON AND TENNIS (RACKET SPORTS)

1. It is always wise to use eye protective devices in racket sports. If the participants do not have eye protection, the class should be organized, in the space available, to reduce the chance of eye injury.
2. The participants must be properly conditioned, with special attention being given to the elbow and shoulder joints.
3. The proper body mechanics and skill techniques should be used in striking the projectile. This may reduce shoulder, elbow, and wrist injuries.
4. Racket swinging should be done at safe distances from others.
5. All inside areas should be properly ventilated and lighted.

BASKETBALL

1. Correctly fitted shoes will reduce foot injury. High top shoes, taping, and braces are good prevention for weak ankles.
2. Conditioning and warm-up procedures should be used regularly.
3. Jewelry and sharp ornamental objects should be removed during work-outs.
4. Obstructions should be cleared from the court area and sidelines.

BOWLING

1. The ball should fit the bowler (in terms of weight and size of finger holes).
2. The bowling ball should be picked up with two hands (with one of the hands under the ball).
3. A moving ball in the ball return may pinch a person's fingers unless the fingers are kept to the outside of the ball.
4. Mechanical problems with the ball returns and pin-setting devices should be handled by the bowling establishment personnel.

CANOEING

1. Coast Guard approved life jackets should be available and worn by each canoeist.
2. The canoe is most stable when one stays low and keeps his/her weight near the centerline of the craft.
3. Participants should know how to swim and be familiar with canoe survival skills.
4. A canoe should not be overloaded so that it sits dangerously low in the water.
5. The paddles should fit the canoeist's height.

FENCING (FOIL)

1. Masks, jackets, and gloves should be properly fitted and worn by all participants.
2. All foil tips should be blunted and all blades should be properly flexed and curved.

3. All broken foil blades should be thrown away.
4. A fencing foil should never be placed in line with another person unless that individual is equipped and ready to fence.
5. Conditioning and warm-up procedures are very important.
6. The fencer should relax the forward pressure after "touches" are made. This will reduce thrusting injuries.

FIELD HOCKEY

1. Protective equipment must be used for the shins and the top of the foot. Eye protection for lens wearers is important.
2. Stocks should be made from a smooth material, with the sharp edges taped.
3. Proper skills and techniques will reduce unnecessary rough play.
4. Level and predictable surfaces should be used.
5. Warm-up and conditioning will prevent muscle injuries.

FLAT FOOTBALL

1. Safe rules should be established and enforced during the game. Two important rules are: no tackling, and never leave the feet to block.
2. The wearing of ornamental objects or jewelry is dangerous during play.
3. The proper skills and techniques should be taught, and overly-aggressive play must be discouraged.
4. The playing surface should offer good traction and predictable footing.
5. Hard-spiked shoes are unnecessary in physical education class competition.

GYMNASTICS

1. All apparatus should be continuously inspected and adjusted for stability and security.
2. Pupils should learn basic skills before they proceed to more sophisticated movements.
3. All participants should be encouraged to concentrate on their movements. Distractions may lead to accidents.

4. Warm-up and conditioning may reduce the chance of injury.
5. Clothing should fit snugly, and jewelry should not be worn.
6. Clean mats, fitting closely together, should be used. This will pad dangerous areas.
7. Capable spotters must be used and good communication must exist between gymnast and spotter.
8. The gymnastic area must be closely supervised. The supervisor should be in an area where all participants are visible.
9. Care of the hands needs to be taken to prevent torn calluses and blistered skin. Chalk should be readily available to gymnasts.
10. Gymnasts must be cautioned not to attempt dangerous and complex movements when they are fatigued.

GOLF

1. A precise area should be designated for each club swinger during class sessions.
2. The swinging of a golf club without checking all around the immediate area for classmates is dangerous.
3. People working in large groups must try to hit golf balls in the same general direction (away from the group).
4. The golf balls may be safely picked up only after the class has finished hitting.
5. Proper etiquette for use on a golf course should be taught.

SOCCER

1. The proper techniques should be used, and overly-aggressive body contact should be discouraged.
2. Dangerous plays with the body, feet, and arms should be penalized.
3. Players should always be conditioned and warmed up in preparation for the game.
4. Shin guards, when available, eliminate many annoying leg injuries.

SOFTBALL

1. The nonbatters must be kept away from the action where they won't get hit with a bat or ball.

2. A mask, mitt, and chest protector must be provided for the catcher.
3. The bat handles should have a nonslippery surface.
4. The infield should be soft and the player's legs adequately protected, if sliding is allowed.
5. The proper techniques of sliding, base running, and tagging of players must be taught.
6. Throwing and hitting practice should be done in designated areas.

SWIMMING

1. Skills should be taught progressively, and the pupils grouped according to their proven abilities.
2. Pupil proficiency in the water should be tested. One should not assume that a pupil has mastered a particular skill.
3. Extension devices (poles, ropes, and rings) should be available near the pool.
4. Rules of conduct around the pool should be established and closely followed.
5. Basic survival skills that could be used in any aquatic situation should be taught.
6. All pupils should be taught artificial respiration and cardio-pulmonary resuscitation.
7. Overcrowding of the pool area may lead to poor supervision and unnecessary accidents.
8. The aquatic supervisor should be in a position to observe all the participants in the pool area.
9. Water temperature, depth, and cleanliness must be controlled. Swimmers should shower before entering the pool.

TRACK AND FIELD

1. Comfortable shoes should be selected. Hard spikes are not necessary in general physical education classes.
2. Runners should run in their lanes. They should stay away from large, bunched starts.
3. The pole vault, long jump, and high jump should have adequate landing areas. If the landing area does not cushion the partici-

pants, it should be reconstructed.

4. Skills in the pole vault, high jump, and hurdles should be taught progressively.
5. The landing areas should be cleared before the next jumper approaches.
6. The discus and shot put should be thrown in isolated areas.
7. The javelin is too risky for general physical education classes.
8. All activities should be preceded by a conditioning and warm-up time. Working on technique rather than maximum effort produces the safest result.

VOLLEYBALL

1. The cables and standards supporting the net must be padded.
2. Relative positions should be played in order to prevent collisions between players.
3. Play must be closely supervised, and the rules governing the net and centerline of the court must be strictly enforced. Opposing player contact may cause injury.
4. Highly-proficient spikers should be cautious when hitting at low skill opposition.
5. Any dangerous obstructions near the court area should be removed.

WEIGHT TRAINING

1. Participants should know the difference between weight training and weight lifting. "Always train; don't strain!"
2. Weight machines with no loose weights are safer for the novice participant.
3. The resistance should be moved in a body position of good leverage. The better the mechanical technique, the less chance of injury.
4. Loose weights (barbells) should have tight-fitting clamps and collars.
5. Spotters should be used for heavy barbell lifts.
6. The participant should begin with low resistances before progressing to greater loads.

7. A weight should be put in its proper storage area after each use to prevent accidental falls or leg injuries to other people.
8. A person should inhale and exhale freely while moving a resistance. This keeps the blood pressure lower.
9. Worn-out parts on the weight machine or the loose weight assemblies should be repaired or replaced.
10. One should be cautious about using homemade lifting devices. They may not be structurally sound.
11. The floor under the weight room must be of reinforced construction.
12. The weight room should be locked when it is unsupervised or not in use.

WRESTLING

1. Snug-fitting clothing and pads must be worn in order to prevent mat burns.
2. Preparation for wrestling should include conditioning and warm-up time.
3. Large, open mat areas are a must for wrestling. The mat segments must be properly joined.
4. The mat surface must be disinfected regularly.
5. Acceptable techniques, within the rules, must be taught. This will reduce the chance of joint, bone, and tendon injury.
6. Mismatches between wrestlers of unequal weight and skill may lead to injury and must not be permitted to occur.
7. No sharp metal objects or jewelry shall be attached to the participants.
8. The wrestling room should be well-ventilated and the temperature controlled.
9. The use of rubberized suits, to make the participant sweat unnaturally, should be questioned.
10. Wrestling activities should be properly supervised as this will reduce the chance of accidents.

LOCKER ROOM, SHOWER ROOM, AND TRAINING ROOM

1. One should move cautiously on slick surfaces.

2. The cabinet and locker doors are to be closed immediately after use in order to prevent the limb and head injuries which might occur to careless individuals in the area.
3. Glass containers must not be used as they may end up broken on the floor. Unbreakable materials are available.
4. Electrical equipment should always be used at a safe distance from wet areas. The use of ground-fault sockets is a safe practice, also.
5. Surfaces should be continuously cleaned and disinfected.
6. Rubber sandals are recommended for use in the shower room as they provide for better traction, foot safety, and foot hygiene.
7. Pupils should be educated in the preventive areas of personal health. A bulletin board of safety rules and procedures is helpful.
8. A person using a therapeutic machine, such as a whirlpool, should always have another individual present to give assistance if necessary.

SAFETY ROLES AND SAFETY VARIABLES IN INTERSCHOLASTIC ATHLETICS

SCHOOL ADMINISTRATORS

1. Competent people should be selected to coach, officiate, and manage.
2. Events should be scheduled at practical times and in safe surroundings.
3. Safe accommodations must be provided for all spectators at athletic events.

COACHES

1. A coach must not use a "win at any cost" philosophy.
2. Scientific methods for training and conditioning athletes are important and should be used.
3. The athletes on the court or field of competition must be closely supervised.

4. A coach should be familiar with the general physiology and anatomy of the body. He/she should also have a practical knowledge of first aid.
5. Only those pupils who have passed a recent physical examination and who have parent permission should be allowed to participate in athletic activities.
6. The use of safety-approved equipment, especially in contact sports, is strongly recommended.

OFFICIALS

1. The game should be controlled according to the specific rules of the event.
2. An official must continuously be on the lookout for safety irregularities.
3. The rules of good judgement and common sense should be applied when unique safety situations occur.

PHYSICAL FACILITIES

1. Competition areas should be spacious enough to allow safe activity. Overcrowding is dangerous.
2. Quality equipment should be used, and it must be properly installed and maintained.
3. Unsupervised "attractive nuisance" areas should be locked and secured.

PLAYERS

1. Individuals should play hard to win, but not to hurt the opponent.
2. Players should know the rules of the game, and the rules governing safety.

INTERSCHOLASTIC ATHLETICS

BASEBALL AND SOFTBALL

1. The catcher and batters should have the equipment necessary to protect them from the force of the ball.

2. Bleachers and team benches should be located in safe and protected areas.
3. Safe sliding procedures must be used.
4. The field of play should be smoothed and raked regularly.

BASKETBALL

1. All personal gear should be clean and well-fitting.
2. Safety lenses are necessary for all players wearing glasses.
3. All obstructions should be cleared from the court area and side-lines.
4. The court surface should be checked often to insure a high degree of foot traction and cleanliness.
5. Crash pads should be put on the end walls behind the baskets if the distance from the end line to the wall is less than 15 feet.
6. Time should be allowed for the participants to warm up prior to practices and games.

CROSS-COUNTRY

1. Participants should run away from heavily-traveled roads.
2. If a runner must run on a roadway, he/she should run on the left-hand side of the road, facing the traffic.
3. Thorough pre-race checks of cross-country courses should be made. Holes, congested areas, and path obstructions are important in this examination.
4. Water should be readily available to the runners in training or competition.
5. The body should be proportionally clothed according to the temperature of elements that are to be incurred.
6. The participants must be carefully conditioned and trained. Pain to the body is often a warning sign that should be examined.
7. Quality footwear is of paramount importance to a runner. Good footwear helps to prevent injury.

FOOTBALL

1. One week of practice should be devoted to conditioning before pads are worn for "hitting" drills.
2. The players need quality equipment. The helmet should meet the standards of the National Operating Committee on Standards in Athletic Equipment (NOCSAE).
3. Many water breaks are needed during hot weather. A coach should schedule practices during the cooler parts of the day.
4. A coach must teach safe techniques on this sport. For example, he/she should stress "shoulder" tackles rather than "sticking the head in" to the opponent.
5. Trained medical people should be on hand at each game. They should have the capability for safely removing injured players from the field to the hospital.
6. Coaches, officials, and fans should not tolerate a game that gets out of control. Everyone must closely respect the rules of the game.

GOLF

1. The club should only be swung at a safe distance from others.
2. Golfers should read local instructions and rules in the "pro" shop or on the back of the scorecard. It may be improper and unsafe to hit directly at the green of a dog-leg hole since one's shot may have to land in an adjacent fairway.
3. All golfers should obey course etiquette. They should yell "fore" on misguided shots near others.
4. One should know how to drive an electric cart before assuming the controls.
5. It is unsafe to play during lightning storms.

GYMNASTICS

1. Equipment must be properly set up, repaired, and maintained. Initially, top quality equipment should be procured.
2. All apparatus should be carefully and strategically placed in the space available for the gymnastic meet.
3. The mats must be safely laid out around the apparatus (see Section VI--Equipment/Major Appliances).

4. Chalk is to be used for the hands with supporting straps for the hands and wrists.
5. A sufficient area should be allowed for the teams to rest and/or warm up safely. This area must be away from the meet apparatus.
6. The spectators should be sufficiently informed and educated in gymnastics so they will not disturb the concentration of the participants.
7. The coach should supervise practice very closely and utilize the proper spotting methods.

SOCCER

1. Shin guards and knee pads should be made available to those players who are prone to lower leg injuries.
2. The crowds viewing the contests should be controlled and away from the sideline area.
3. The coach must teach the legal methods to use in charging and tackling the ball.
4. The goal keeper needs to be instructed in the proper techniques of leaving the ground to receive the ball.
5. Frequent water breaks should be taken, especially during hot weather.

SWIMMING AND DIVING

1. Water temperature, depth, and cleanliness (bacteria) must be closely monitored.
2. The air temperature in the pool area should be carefully controlled.
3. Spectators should be seated well away from the diving and swimming area.
4. Good acoustics in the pool area are quite important. The use of an excessively loud starting signal (i.e., blank pistol) may injure the ears.
5. The diving pool should be sufficiently deep and wide. It should also be free from lane markers and obstructions.
6. The diving board equipment must be properly maintained. The coach should establish rules to govern the use of the board.
7. The easier diving techniques should be taught before the more complex moves are demonstrated.

8. Footwear should be worn when leaving the pool area.
9. The pool area must be locked and secured when it is not sufficiently supervised.

TENNIS

1. Players and nonplayers should place their rackets, tennis balls, cans, extra clothing, clipboards, and other paraphernalia away from the court.
2. Drinking water should be available. During warm weather, practice should be held in the cooler part of the day.
3. There should be designated practice areas and hitting boards. A schedule to govern their use during competition is quite important.
4. All spectators should be out of range of stray shots.
5. The body must be adequately protected against the sun's rays.

TRACK AND FIELD

1. Spectators must be kept behind barriers, especially during the shot put, javelin, and discus events.
2. It is important that a loudspeaker be used to coordinate the starting of events, and the movement of people and equipment on the track during competition.
3. Participants should stay off the track except for the designated times for the pre-race warm-up.
4. Athletes must always be warmed up and conditioned. They should work on flexibility exercises, especially in conjunction with weight training.
5. Even minor injuries must be treated! Common sense should be exercised in workouts to prevent the aggravation of old injuries.
6. The inside lanes should be reserved for the faster running workouts, and the outside lanes should be used for slow-pace work.

VOLLEYBALL

1. The proper techniques of diving and rolling on the court must be taught.
2. Standards, cables, and official stands should be safely designed and/or padded to protect the players.

3. Knee pads should be available for those players who are prone to knee injuries.
4. Flexibility exercises should be used for warm-ups and for the prevention of injuries. One should be especially careful not to encourage an injury by hitting hard without a warm-up.

WRESTLING

1. The weight reduction program set forth by the state high school activities organization should be followed. Crash weight-loss programs may be harmful.
2. The exposed surfaces in the wrestling room must be padded.
3. Mat surfaces should be disinfected regularly.
4. Competent officials should be hired to regulate all competition.
5. Mismatches in size, weight, and skill could result in injuries.
6. Headgear should be worn. Areas of the body that may be susceptible to injury (i.e., the knee) must be padded.
7. Hair and fingernails should be kept trimmed.
8. Jewelry should not be worn when wrestling.
9. Competent coaches, who can intelligently train and condition the athlete, need to be employed.
10. The temperature and ventilation of the wrestling room must be kept monitored.
11. Frequent water breaks are necessary to control dehydration.
12. Suitable, snug-fitting clothing should be worn when wrestling. Full-length impermeable/rubberized outfits need to be avoided as they promote excessive water loss from the body.

SCIENCE EDUCATION

GENERAL SAFETY GUIDELINES

Laboratory activities play an important role in the various physical and biological sciences. These activities become even more important when the pupil participates in the learning opportunities and becomes an active member of the classroom. With an increased involvement of the pupil, safety becomes a factor which must be approached in a conscientious, continuing manner. A positive approach to creating safe and healthful surroundings is essential to everyone involved in any science program. Health and safety must be given a priority in planning and preparing lessons and laboratory experiences. The following guidelines are suggested for teacher consideration.

1. The teacher must be present for supervision and close watch of all laboratory activities. The teacher must be responsible for the pupil during the time he/she is assigned to that classroom.
2. The teacher must assume the obligation of teaching the basic safety practices required for science laboratories.
3. Health and safety study must be integrated into the science curriculum.
4. Many accidents in the science laboratories are caused by carelessness, and a negative attitude toward safety assumed by both the teacher and pupil.
5. The teacher must assume the most important role and show by example the necessity of proper behavior in the laboratory. The laboratory should be treated as a "place of business" where no misbehavior can be accepted.
6. It is recommended that a daily safety inspection of the laboratory be made by every science teacher. A more thorough inspection should be made at regular intervals. Teacher-made check lists may be used if the school does not provide them.
7. The teacher should be aware that new information may be available concerning the safety of certain substances in the classroom. The teacher must be responsible for either removing or controlling the use of these substances and/or procedures.

8. Since safety precautions and guidelines in textbooks and laboratory manuals may be inadequate or missing altogether, it becomes necessary for the teacher to assume the responsibility for providing the necessary instruction.
9. Safety protective devices such as safety glasses or goggles, face shields, lab coats or aprons, gloves, filter masks, and protective creams or lotions must be made available to everyone, when necessary. The teacher must be responsible for deciding when any of these devices are needed and must make sure they are in usable condition.
10. The teacher should make an effort to have information on any pupil who has allergies or other health problems which may make it dangerous for him/her to handle animals or chemicals.
11. The teacher must be aware of the special needs of the handicapped pupil and the pupil with serious medical disorders, and in some cases be prepared to provide special safety procedures for him/her.
12. Experimental procedures should be tried out by the teacher in advance. In this way, potential safety and health hazards can be identified and safety instruction planned.
13. The pupil must be carefully taught to realize the seriousness of safety and health hazards that are present in high school laboratory work.
 - A. At the beginning of each term, instruction in general safety practices should be given to all science classes.
 - B. Each science teacher should prepare and give to each pupil a set of written rules for laboratory activities. Each item should be stated as clearly as possible.
 - C. A safety contract signed by the pupil may be used to emphasize the importance of safety awareness and acceptance by the pupil. The contract should be filed and reviewed as the occasion necessitates.
 - D. It is suggested that each pupil be required to take and pass a written test over safety rules presented by the teacher before beginning work in the laboratory.

LABORATORY ASSISTANTS, CLASSROOM AIDES, AND PROJECT ROOMS

It is recommended that serious consideration be given to the selection of responsible and qualified pupils to act as laboratory assistants and classroom aides under the direct supervision of the teacher. Safety and health instruction shall be given at the beginning of each year and reviewed periodically.

AIDES/ASSISTANTS should not:

1. handle equipment, chemicals, or other substances unless instructed to do so by the teacher.
2. carry equipment in the hall during passing periods.
3. carry large quantities of chemicals. (If chemicals must be moved from one place to another, they must be in the proper carrying containers.)

Aides and assistants doing individual research projects should be supervised and given the proper safety instruction, when necessary. Projects should be approved by the teacher.

PROJECT ROOMS should not be part of the storage room. There should be adequate working space. Only reliable pupils should be allowed to do individual projects.

Equipment, supplies, and safety instruction must be given to the pupil. Accidents and injuries should be reported to the teacher.

PUPIL PROJECTS initiated in the project room should be approved and supervised by the teacher. The project room should be locked when not being used.

PUPIL SAFETY CONTRACT

I will:

1. Follow all written and oral instructions given by the teacher.
2. Behave in a manner that will ensure the health and safety of myself and other class members at all times.
3. Use protective devices for my eyes, face, hands, body, and clothing during laboratory activities.
4. Know the location and use of first aid and fire extinguishing equipment.
5. Refrain from eating or drinking in the laboratory.
6. Keep my work area clean and clutter-free during class time.

I understand and realize that many accidents are caused by carelessness and hurry. I will come to class prepared to be responsible so that the safety and welfare of myself and others is protected.

I have read the set of written safety rules prepared by my teacher and agree to follow these and any other rules that may be made.

Date _____ Signed _____

FIELD TRIPS -- should be well planned and organized by the teacher.

1. Parental permission should be obtained before taking the pupil on any field trip.
2. All school policies concerned with the transporting and supervision of pupils should be understood and followed.
3. The teacher should be aware of all the responsibilities and liabilities that are connected with accompanying classes on trips outside the school building.
4. The teacher should have a thorough knowledge of the area to be visited and of any potential dangers that may be present.
5. Before going on the trip, the teacher should give the class the necessary instruction on proper conduct and special safety precautions.
 - A. Pupils should be informed of the proper clothing and shoes that are necessary for the trip.
 - B. The presence of poisonous plants and animals should be pointed out, if necessary.
 - C. Insect repellants may be needed.
 - D. Glass jars should not be carried -- a pupil could fall and injure himself/herself.
 - E. Equipment should be carried in such a way as to avoid injury to the carrier and damage to the equipment should the carrier fall.
 - F. Plans should be made for the pupil who may suffer allergic reactions to dust, pollen, or certain plants.
 - G. A "buddy system" should be used to help keep the group together.
6. Special care should be taken if the field trip will take the pupil near swiftly-moving or deep water. Floatation rings and ropes should be carried for emergency use. Life jackets should be taken and used, if necessary. If the pupil must be in the water, he/she should be advised to "slide" his/her feet along, stay with the group, and wear shoes.
7. Proper adult supervisors must be taken on these field trips. An adult with knowledge in basic first aid, artificial respiration, and snake bite treatment should be present on field trips where special emergencies may arise.

8. The teacher should be familiar with basic first aid. A stocked first aid kit should be taken along on the field trip. A snake bite kit and knowledge of acceptable snake bite treatment is necessary if poisonous snakes may be present in the area.
9. Paper, plastic, or cloth collecting bags should be used for collecting specimens on a field trip - no glass containers.
 - A. Know the poisonous plants in the area.
 - B. Don't put parts of any plant in the mouth.
 - C. Don't rub sap or plant juice in the eyes or on an open sore.
 - D. Don't inhale smoke from a burning plant.
 - E. Don't pick unknown plants.
 - F. Wash the hands before eating.
 - G. Wash exposed parts of the body with strong soap after the field trip, to avoid any skin irritation from contact with plants.
 - H. Keep away from areas where known mite and tick populations are found.

BIOLOGICAL SCIENCES

GENERAL SAFETY RULES

1. All pupil laboratory work should be carried out in the presence of a qualified teacher who has given the appropriate instructions for procedure and safety.
2. The pupil should be made aware (at the beginning of each laboratory period) of the specific dangers to be encountered and the necessary precautions that are required for work when there is a special hazard present.
3. The pupil should be directed to read all of the instructions relevant to carrying out laboratory activities. All of the directions must be carefully followed with no changes initiated by the pupil without teacher permission.
4. Every pupil should be made aware of the emergency procedures which may need to be followed, such as:
 - A. Fire drill exits and procedures.
 - B. Severe storm warnings and drills.
 - C. First aid.
 - D. Use of fire extinguishers, fire blankets, and sand.
 - E. Methods for securing help quickly.A plan should be made for stopping work, extinguishing burners, etc, in the event any of the above should occur.
5. Careless habits, and clothing which could cause accidents and spills, should be pointed out to the pupils. Emphasize the following:
 - A. Leaning on or across tables is hazardous.
 - B. Loose clothing may catch on fire.
 - C. Shoes with open toes and high heels may cause bad falls.
 - D. Unnecessary books, coats, and papers should not be brought to the laboratory.

6. Long hair should be tied back during laboratory activities. Hair can obstruct the pupils view, and it is flammable.
7. Eating or drinking in the laboratory or from laboratory equipment should never be done.
8. Cleanliness is necessary for the biological laboratory. The hands should be washed after laboratory activities involving chemicals of any kind, animals, microorganisms, and preserved specimens.
9. Chemicals should be kept in a designated, locked area, and dispersed only by a teacher or qualified aide.
10. Containers holding chemicals must be labeled for identification purposes. The following information is suggested for the label:
 - A. Name of substance
 - B. Name of person who prepared the substance
 - C. Date the substance was prepared
 - D. Any hazard the substance presents
 - E. Antidote
11. Safety eye protection must be worn at all times during laboratory activities when any chemicals are used; and when there is any possibility of flying objects, glass breakage, or the presence of harmful vapors.
12. Accumulated materials that are a safety hazard should be removed from the classroom and storage areas. This includes glassware, equipment, and chemicals on demonstration tables, or on shelves that may be overloaded.
13. All hot plates and open burners should be checked and turned off before leaving the laboratory.
14. Food which is to be eaten by humans should never be stored in the same cupboard or refrigerator where chemicals or biological materials are kept. Food contamination is too great a possibility.
15. Glassware should be made of heat-resistant material, free of any cracks or chipped edges.

16. Working with microorganisms requires special handling techniques, and may require specialized equipment. A potential health hazard is present when microorganisms are being used. Only nonpathogenic bacteria should be used in the laboratory. For specifics, see the section on Microorganisms in the Classroom.
17. Care should be used in scraping cheek cells from the mouth for microscopic study. Clean, blunt wood splints (or toothpicks) should be used. Never use a scalpel, or other pointed object. Splints should be used only once, then discarded.
18. All cutting tools and sharp-edged instruments must be put away when not in use. Double edged scalpels and razor blades should never be used. Pupils should be properly instructed in the use of such equipment. For specifics, see the section on Dissection of Preserved Materials.
19. The proper disposal of chemicals, broken glass, and preserved specimens is vital. Labeled, closed containers should be provided for each science laboratory, and the pupil should be instructed in the use of these containers.
20. Carbon tetrachloride is extremely poisonous. It should be used only when necessary, in a well-ventilated room. It is not advisable to use carbon tetrachloride in insect-killing jars.
21. Benzene, methyl alcohol, acetone, and other common organic solvents should be used with good window ventilation or fume hoods.
22. PTC paper should be used with caution. It has not been approved by the FDA for use. The substance has been described as a rodenticide in Dangerous Properties of Industrial Chemicals.
23. Pipettes equipped with suction bulb should be used to transfer liquids and cultures. Do not bubble air through the liquid with the pipette. This prevents any splattering of the liquid.
24. Pupil-made tin can calorimeters should be used with extreme care. The cans should be clean before using. All sharp edges should be covered with heat-resistant tape, and the apparatus used on a heat-resistant, nonflammable surface.
25. Open flames must not be used in laboratory activities when volatile liquids (ether, carbon disulfide, alcohol, benzene, etc) are also being used. Rags, or cotton swabs saturated with these substances, should be disposed of in fireproof containers.

26. An electric heat source is safer than an open flame for heating alcohol or other flammable liquids. If alcohol is to be heated, it should be in a water bath container with the top of the beaker holding the alcohol below the top of the water bath container.
27. Ether is both flammable and explosive. Excessive exposure to fumes could cause the collapse of the person handling it. If it must be used, the smallest quantity necessary should be purchased. There should not be long-term storage of this substance. Spills should be wiped up immediately, and wet materials put into a fume hood until evaporated.
28. The use of an autoclave (pressure cooker) should be restricted to the teacher. The teacher should know the directions for its use and should heed the following:
 - A. Do not use an autoclave that is cracked or has a defective seal.
 - B. Examine the safety valve before each use for foreign material which may stop it up.
 - C. Always maintain the pressure within the safety zone.
 - D. Maintain pressure of fifteen (15) pounds. This should be sufficient for sterilization.
 - E. Remove the autoclave from the heat at the end of the heating time.
 - F. Be sure the pressure gauge reads zero (0) before attempting to open the lid. Do not force the lid open. If this is necessary, it may mean that the pressure is not sufficiently reduced.
 - G. Use eye protection when using an autoclave.
 - H. Always open the lid of an autoclave away from the body and face or from anyone standing nearby. The steam can produce serious burns.
 - I. Check the pressure gauge for accuracy on a regular basis.
29. Excessive amounts of pollen or mold spores can be dangerous to a pupil with allergies. Avoid distributing large amounts in the classroom.
30. Care should be used in inserting glass tubing into rubber stoppers. For specifics, see the section on Equipment-- Glassware.

31. The pupil needs to be cautioned in the use of bunsen or alcohol burners. For specifics, see the section on Bunsen Burners and Alcohol Burners.
32. Radioactive materials should be used and experimented with only if low radioactive materials are available. For specifics, see the section on Radioactivity.
33. Field trips should be well-planned and organized. School policies on transportation and student-adult ratios should be followed. For specifics, see the section on Field Trips.
34. Lasers can be a potential hazard to people in a classroom. They should be operated only by qualified persons. For specifics, see the section on Use of Lasers.
35. Animals in a classroom must be taken care of and used with the welfare of the animals in mind. The pupil should be instructed in the humane care and handling of these animals. For specifics, see the section on Animals in the Classroom.
36. Laboratory experiments involving student blood samples should be done only with sterile, disposable equipment, and on a volunteer basis. Parental permission should be obtained, according to school policies, or if the teacher feels that it is necessary. For specifics, see the section on Pupil-Prepared Blood Smears.
37. If insect-killing jars are prepared with alcohol, chloroform, or ether, the pupil should be warned that these chemicals are poisonous and flammable. Potassium cyanide should never be used.
38. Microscopes should be used with care, and the pupil should be cautioned about the danger of broken slides and the wrong kind of lighting. Reflected sunlight can cause damage to the eye.

POISONOUS PLANTS

Many common plants found in homes and yards pose a threat to teachers, parents, and children because of their poisonous nature. Potentially dangerous plants and poisonous parts, and symptoms of poisoning follow.

HOUSE PLANTS

<u>Plant</u>	<u>Toxic Part (s)</u>	<u>Symptoms</u>
Hyacinth, Narcissus, Daffodil	Bulbs	Nausea, vomiting, diarrhea
Oleander	Leaves, branches	Extremely poisonous. Affects the heart, produces severe digestive upset, and has caused death.
Dieffenbachia (Dumb Cane) Elephant's ear	All parts	Intense burning and irritation of the mouth and tongue. Death can occur if the base of the tongue swells enough to block the air passage of the throat.
Rosary pea, Castor bean	Seeds	Fatal. A single rosary pea seed has caused death. One or two castor bean seeds are near the lethal dose for adults.
Poinsettia	Leaf	One leaf can kill a child.
Mistletoe	Berries	Can be fatal.

FLOWER GARDEN PLANTS

Larkspur	Young plant, seeds	Digestive upset, nervous excitement, depression. May be fatal.
Monkshood	Fleshy roots	Digestive upset and nervous excitement.
Autumn crocus, Star-of-Bethlehem	Bulbs	Vomiting and nervous excitement.

<u>Plant</u>	<u>Toxic Part (s)</u>	<u>Symptoms</u>
Lily of the valley	Leaves, flowers	Irregular pulse, usually accompanied by digestive upset and mental confusion.
Iris	Underground stems	Severe, but not usually serious, digestive upset
Foxglove	Leaves	One of the sources of the drug digitalis, used to stimulate the heart. In large amounts, the active principles cause dangerously irregular pulse, usually a digestive upset, and mental confusion. May be fatal.
Bleeding heart (Dutchman's breeches)	Foliage, roots	May be poisonous in large amounts. Has proved fatal to cattle

VEGETABLE GARDEN PLANTS

Rhubarb	Leaf blade	Fatal. Large amounts of raw or cooked leaves can cause convulsions and coma, followed rapidly by death.
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ORNAMENTAL PLANTS

Daphne	Berries	Fatal. A few berries can kill a child
Wisteria	Seeds, Pods	Mild to severe digestive upset. Many children are poisoned by this plant.
Golden chain	Bean-like capsules in which the seeds are suspended	Severe poisoning. Excitement, staggering, convulsions, and coma. May be fatal.
Laurel. Rhododendron. Azalea	All parts	Fatal. Produces nausea and vomiting, depression, difficult breathing, prostration, and coma

<u>Plant</u>	<u>Toxic Part (s)</u>	<u>Symptoms</u>
Jessamine	Berries	Fatal. Digestive disturbance and nervous symptoms.
Lantana camara (red sage)	Green berries	Fatal. Affects lungs, kidneys, heart, and nervous system. Grows in the southern U.S. and in moderate climates.
Yew	Berries, foliage	Fatal. Foliage more toxic than berries. Death is usually sudden, without warning symptoms.

TREES AND SHRUBS

Wild and cultivated cherry	Twigs, foliage	Fatal. Contains a compound that releases cyanide when eaten. Gasping, excitement, and prostration are common symptoms that often appear within minutes.
Oak	Foliage, acorns	Affects the kidneys gradually. Symptoms appear only after several days or weeks. Takes a large amount for poisoning. Children should not be allowed to chew on acorns.
Elderberry	Shoots, leaves, bark	Children have been poisoned by using pieces of the pithy stems for blowguns. Nausea and digestive upset.
Black locust	Bark, sprouts, foliage	Children have suffered nausea, weakness, and depression after chewing the bark and seeds.

WOODED AREA PLANTS

<u>Plant</u>	<u>Toxic Part (s)</u>	<u>Symptoms</u>
Jack-in-the-pulpit	All parts, especially roots	Like dumb cane, contains small needle-like crystals of calcium oxalate that cause intense irritation and burning of the mouth and tongue.
Moonseed	Berries	Blue, purple color, resembling wild grapes. Contains a single seed. (True wild grapes contain several small seeds.) May be fatal
Mayapple	Apple, foliage, roots	Contains at least 16 active toxic principles; primarily in the roots. Children often eat the apple with no ill effects, but several apples may cause diarrhea.

SWAMP OR MOIST AREA PLANTS

Water hemlock	All parts	Fatal. Violent and painful convulsions. A number of people have died from hemlock.
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FIELD PLANTS

Buttercup	All parts	Irritant juices may severely injure the digestive system.
Nightshade	All parts, especially the unripe berry	Fatal. Intense digestive disturbances and nervous symptoms.

FIELD PLANTS (continued)

<u>Plant</u>	<u>Toxic Part (s)</u>	<u>Symptoms</u>
Poison hemlock	All parts	Fatal. Resembles a large wild carrot. Used in ancient Greece to kill condemned prisoners.
Jimson weed (thorn apple)	All parts	Abnormal thirst, distorted sight, delirium, incoherence, and coma. Common cause of poisoning. Has proved fatal.

ANIMALS IN THE CLASSROOM

1. Classroom animals should be provided with the proper care, food, cleanliness, and facilities at all times. The well-being and care of the animals should be considered at all times and taught to the pupil.
2. The pupil should be cautioned against provoking an animal by poking it, shaking its cage, or putting objects into the cage. Hands should be kept out of the cage at all times.
3. If animals are to be handled, only supervised pupils should do so. Gloves should be worn to protect the hands.
4. Pregnant, nursing, or excitable animals should not be handled.
5. Wild animals, or pets unknown to the pupil, should not be brought to or kept in the classroom. Injury and/or disease may be present and may be transmitted to the pupil.
6. Some pupils may have allergies to certain animals. They should be cautioned to avoid contact with these animals.
7. Parent permission should be obtained before a pupil is allowed to take an animal home.
8. If an animal appears to be ill, it should be isolated from the pupils and other animals. Some danger signs to look for include:
 - A. Loss of appetite.
 - B. Unusual irritability or sluggishness.

- C. Unusual odor or discharge.
 - D. Change in the color or condition of the fur.
9. Many common animals may be dangerous to the pupil or may cause harmful reactions when handled carelessly. These include certain insects, bees, spiders, snakes, rodents, etc. Care must be exercised in the choice and inclusion of these in classroom study.
 10. Lower classified animals (non-vertebrates) should be used for experimental study, whenever possible.
 11. No vertebrate animal should be exposed to inhumane, unusual, or cruel experimental procedures which may cause pain, distress, or which may interfere with its normal functioning.
 12. No experiment with animals should be conducted without the approval and supervision of the teacher.
 13. No animal should be subjected to experiments involving surgery, the injection of pathogenic organisms, drugs, or harmful chemicals; or to lengthy deprivation of food or water, extreme conditions of temperature, noise, fumes, or other external stimuli.
 14. Embryology studies should be well-planned and carried out. Embryos should be humanely killed, no later than the nineteenth day of development. Hatched specimens should be cared for properly.
 15. The study of live animals should be limited to the normal activity, functioning, and behavior of the particular animal involved.
 16. Respect for the life and health of the animals should be shown at all times.
 17. All local, state, and federal guidelines must be followed in the use, care, and housing of classroom animals. The Humane Society of the United States (Washington, D.C. 20037) has literature available.

PUPIL PREPARED BLOOD SMEARS

It is recommended that any laboratory activities involving the use of a pupil's blood smears be conducted on a volunteer basis; with other activities provided for the pupil who chooses not to participate.

Parent permission for blood-letting activities should be secured if it is required by school policy or if the teacher feels it is necessary.

PUPIL PREPARED BLOOD SMEARS (continued)

Sterile techniques should be followed in obtaining pupil blood samples:

1. Only individual, sterile lancets should be used.
2. Each lancet should be used once, then disposed of in a specially marked container.
3. One should not use a lancet that has not been sealed in a sterile wrapper, or one that has been placed on a desk top or other surface.
4. The hands should be washed with soap, rinsed well, and dried before making the puncture.
5. The finger to be punctured should be cleaned with sterile cotton soaked in 70 percent isopropyl alcohol before and after the puncture.
6. The teacher or the individual pupil should puncture his/her finger.
7. Contact between the finger and the glass slide on which the blood is to be placed should be avoided.
8. Sterile gauze should be held with light pressure over the puncture until the bleeding stops.

MICROORGANISMS IN THE CLASSROOM

Teachers must be aware of the special hazards present when possibly pathogenic organisms are used in a classroom. Pathogenic organisms should not be used in a school biological science program.

Sterile materials and nonpathogenic cultures should be ordered from a reputable biological supply house.

The safety rules already identified should be followed in any laboratory activities involving microorganisms. Further points to be stressed are:

1. No food or drink should be taken into the lab where microorganisms are being studied.
2. Personal cleanliness is a must. The hands should be kept away from the face and washed thoroughly before leaving the room.
3. No food or beverages should be stored in the same refrigerator with microorganism cultures.

4. Safety goggles should be worn during laboratory activities.
5. Glassware used for laboratory activities should be free of cracks and chipped edges. It should also be heat resistant to avoid injury and possible infection to the student.
6. All equipment and materials used with microorganisms must be sterilized immediately after use. A strong disinfectant solution (such as carbolic acid, Lysol, chlorine bleach, etc.) may be used.
7. Liquid cultures may be poured into a disinfectant solution, then poured down the drain, followed by water.
8. Sterilization may be taken care of with an autoclave. All safety precautions for the use of an autoclave should be observed.
9. Petri dishes passed around for inspection should be taped shut to prevent any further contamination and exposure of pupils to spores or microorganisms.
10. Care should be exercised when fixing specimens on glass slides. Excessive heat could cause a slide to break or shatter.
11. Care must be exercised when bunsen burners or alcohol lamps are being used to flame wire loops.
12. Inoculating loops used to transfer bacteria cultures must be flamed before and after the transfer. Loops should be cooled before placing them in liquids to avoid splattering.
13. Breaking the culture film in the loop can allow microorganisms to be spread over surface areas and in the air. Care must be taken to avoid jerky movements or striking the loop against an object which could cause the film to break.
14. One must not stir or agitate a culture with an inoculating loop.
15. A pupil should be warned of the danger of contamination if the loop should be placed on another person, book, or clothing.
16. Mouth pipettes should not be used to transfer microorganism cultures. Bulb suction should be used with the pipette to avoid any possible contact with the culture. See the section on Pipettes
17. When preparing temporary mounts, sewer water should never be used.
18. Hands should be kept away from the face while using stagnant water to prepare temporary slides.

19. A pupil with open sores or cuts on the hands should not prepare mounts using stagnant water.
20. Glassware and equipment used to make temporary mounts should be sterilized after each use.

DISSECTION OF PRESERVED MATERIALS

1. Protective safety goggles must be worn during dissections.
2. Some pupils may be allergic to formaldehyde or other preservatives. Therefore, the skin should be thoroughly rinsed with water if any preservative comes in contact with it. Protective gloves and aprons should be available for laboratory use, also.
3. Preserved specimens should be thoroughly washed with running water (24 hours is suggested) before usage.
4. Gloves, tongs, or forceps should be used to protect the hands when specimens are removed from the preservatives.
5. Adequate ventilation must be provided in the room where preserved specimens are being used.
6. Specimens should be carefully supported for dissecting. A specimen should never be dissected while being held in the hands. The pupil should be instructed to cut down on the specimen against the bottom of a waxed pan.
7. Before allowing the pupil to work with dissecting tools, the teacher should be sure that the proper instruction has been given. The following are points to emphasize:
 - A. All dissecting tools should be considered dangerous.
 - B. A dull instrument may cause a more serious injury than a sharp one.
 - C. Double-edged scalpels and razor blades should never be used.
 - D. The fingers should never be used to test for "sharpness."
 - E. The teasing of needles can cause puncture wounds and serious infections.
 - F. Dissecting pins or other tools should never be put in the mouth.
 - G. Dissecting tools must not be used to cut or prepare food-- food should never be in the laboratory.

- H. Dissecting tools should be locked up when not in use. Before putting them away, one should see that they are clean, dry, and in good condition.
8. Dissection tools not in usable condition should be discarded in a specially marked container.
 9. Preserved specimens should be properly stored in heavy plastic wrap, or in suitable plastic or metal containers with tightly-fitting lids.
 10. Dissected materials must be disposed of safely and properly. School policies and environmental codes should be consulted. Materials to be disposed of should be placed in a specially marked, closed container to await pickup.

GENERAL SCIENCE SAFETY TEST.

It would be desirable for the General Science teacher to consult the various areas of science and choose those items that pertain to the particular classroom and subject areas. Following are some sample questions that are applicable to most laboratory science classes.

GENERAL SCIENCE SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

1. How should an electrical plug be removed from a socket? _____

2. What should be done when a Bunsen burner strikes back? _____

3. What is the procedure for lighting and adjusting an alcohol burner?

4. What types of glassware can be heated? _____

5. Which four parts of the body are particularly vulnerable to chemicals and their fumes? _____

6. Why incline a test tube in which a liquid is being heated away from oneself and others? _____

7. What is the safety rule for the wearing of goggles in the laboratory?

8. What is the safety rule regarding the tasting or touching of chemicals in the laboratory? _____

9. What procedure should be followed when lighting a gas burner?

10. What is the proper way to smell an unknown chemical? _____

Multiple Choice

_____ 11. When chemicals are spilled on the skin or clothes, the first thing to be done is:

- A. notify the teacher.
- B. wipe it off with a dry paper towel.
- C. flush the area with water.
- D. dry it off with a fan

_____ 12. Chemical residues, broken glassware, spent matches, etc. should be discarded:

- A. in the regular wastepaper basket.
- B. in earthenware jars.
- C. in metal containers with lids.
- D. wrapped in paper and thrown in the trash.

_____ 13. When striking a match:

- A. strike it downward and away from oneself.
- B. strike it toward oneself.
- C. strike it under the table.
- D. strike it on the bottom of the shoe.

_____ 14. When forcing glass tubing into the hole of a stopper (with a twisting motion), the pupil should use as a lubricant:

- A. water.
- B. soap.
- C. glycerine.
- D. none of these.
- E. all of these.

- _____ 15. Chemicals in the eye(s) should be treated by:
- A. running to the teacher.
 - B. holding the eye(s) shut with the hand.
 - C. swabbing the eye(s) with wet paper towels.
 - D. flush the eye(s) with water.
- _____ 16. To treat burns that are caused by touching hot objects, one should:
- A. bandage them with a clean cloth.
 - B. apply a generous amount of burn ointment.
 - C. flush them with cold water.
 - D. apply a light oil and bandage.
- _____ 17. Labels on chemicals and instructions for use of equipment should be read:
- A. one time.
 - B. three times.
 - C. five times.
 - D. six times.
- _____ 18. Gas burners should be lighted:
- A. with a match.
 - B. with a striker.
 - C. with a splint.
 - D. by using a rolled up piece of paper.
- _____ 19. To extinguish a fire in a beaker or test tube:
- A. cover it with an asbestos pad or glass plate.
 - B. pour water on it.
 - C. throw the flaming object in the sink and turn on the water.
 - D. use the fire extinguisher on it.
- _____ 20. In case of spills the pupil should:
- A. notify the teacher immediately.
 - B. use paper towels and clean it up.
 - C. call the custodian.
 - D. clean it up at the end of the day.

BIOLOGY SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

1. What four things should be found on the label of a chemical container used in the classroom?

1. _____

2. _____

3. _____

4. _____

2. What are the four emergency procedures that must be followed if a serious emergency occurs?

1. _____

2. _____

3. _____

4. _____

3. Why is safety in a biology classroom of the utmost importance to all concerned? _____
-

(Circle true or false)

T F

1. There would be no danger in drinking from laboratory glassware as long as it appears to be clean.

T F

2. Leaning across a table may lead to an accident or spill.

T F

3. Safety goggles must be worn at all times during laboratory activities.

(Circle true or false)

- | | | |
|---|---|--|
| T | F | 4. Razor blades are good dissecting tools. |
| T | F | 5. Preserved specimens may be thrown in the trash after dissection. |
| T | F | 6. Carbon tetrachloride is the safest substance for insect kill-jars. |
| T | F | 7. Ether is both flammable and explosive. |
| T | F | 8. It is all right to use a bunsen burner or alcohol burner to heat alcohol. |
| T | F | 9. Mouth suction is the best way to transfer liquids using a pipette. |
| T | F | 10. Glass tubing should be forced into a rubber stopper to insure a tight fit. |

Multiple Choice

- _____ 1. There is not a danger to the eyes in a science laboratory from:
- A. heating liquid chemicals.
 - B. lasers.
 - C. reflected sunlight from a microscope mirror.
 - D. writing a summary after all chemicals and supplies are put away.
- _____ 2. Alcohol in the science lab is to be heated:
- A. with an open flame.
 - B. with heat from the hands.
 - C. in a hot water bath.
 - C. never.
- _____ 3. Obtain cheek cells for microscopic study by using:
- A. a sharp needle-like probe.
 - B. a flat, blunt, wooden splint or toothpick.
 - C. the fingernails.
 - D. a pencil tip.

Multiple Choice

- _____ 4. Broken glass should be disposed of:
- A. in the class trash can.
 - B. in the trash can, but first wrapped in a paper towel.
 - C. in the sink.
 - D. only in a specially marked container.
- _____ 5. Ventilation from a fume hood or window should be used:
- A. when taking a test.
 - B. when using chemicals that may give off harmful vapors.
 - C. when the room is hot and stuffy.
 - D. a window should never be opened.
- _____ 6. Glassware should be used:
- A. if it is clean and dry.
 - B. if it is free from chips.
 - C. as it is on the shelves.
 - D. both A. and B.
- _____ 7. It is a good thing to:
- A. perform experiments when the teacher is out of the room.
 - B. follow only those directions that seem reasonable.
 - C. be afraid of all chemicals.
 - D. read and follow all directions given in the book or by the teacher.
- _____ 8. It is not necessary for safety in the classroom to:
- A. keep chemicals in a designated, locked area.
 - B. wash the hands after using chemicals and other materials during a laboratory activity.
 - C. wear loose clothing around an open flame.
 - D. keep long hair tied back.
- _____ 9. The following statement is true:
- A. Food should never be stored in a refrigerator with chemicals and biological materials.
 - B. Food may be eaten during laboratory experiments using microorganisms.
 - C. Food contamination is not a problem in a biology lab.
 - D. It is safe to drink from beakers found in the lab.

Multiple Choice

_____ 10. The following is best handled by the teacher:

- A. an autoclave.
- B. the dispensing of dangerous chemicals.
- C. lasers.
- D. all of the above.

THE PHYSICAL SCIENCES

GENERAL SAFETY RULES

1. Proper protective devices (for the eyes and body) should be used when hammering, chipping, or grinding rocks, minerals, or metals.
2. Direct viewing of the sun should be avoided at all times.
3. Direct viewing of infrared and ultraviolet light sources should be avoided at all times.
4. The open end of a heated test tube should never be pointed toward anyone.
5. When alcohol is heated, it must be in a water bath container with the top of the beaker, etc., holding the alcohol below the top of the water bath container.
6. Volatile liquids such as ether, gasoline, alcohol, and carbon disulfide should be used in very small quantities away from open flames and in a well-ventilated room. Such substances should be heated electrically or in water baths.
7. Broken or chipped glassware should not be used.
8. Breathing gases, especially in high concentrations, can be very dangerous. Carbon dioxide is no exception, as unconsciousness can result within seconds if high concentrations are breathed. Breathing pure nitrogen, argon, helium, or hydrogen is dangerous.
9. Chemicals should not be tasted for purposes of identification.
10. When heating materials in glassware by means of a gas flame, the glassware should be protected from direct contact with the flame through the use of a wire gauze or asbestos-centered wire gauze.
11. Acid and alkaline spills should be neutralized immediately. Water must not be poured into acid. The acid should be put in the water.
12. Broken glass in sinks should be promptly removed as it presents a serious hazard.

13. A fume hood should be used when dealing with highly volatile, toxic fumes.
14. When working with flammable liquids:
 - A. Have a CO₂ or multipurpose fire extinguisher available.
 - B. Work in a well-ventilated area.
 - C. Keep the liquid over a pan or sink.
 - D. Use no flames or high-temperature heating devices.
 - E. Do not store in a home-type refrigerator. Fumes may be ignited by sparks produced in the electrical switching system. (Explosion-proof refrigerators are available from science supply houses).

MODEL ROCKETRY

1. Teachers who plan to have pupils launch rockets should obtain a guide entitled, Code for Model Rocketry, 1968 (#41L) available from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
2. Model rockets should use solid propellant reaction engines produced by commercial manufacturers. The manufacturers' instructions should be carefully followed, and no alteration or reloading of engines should be allowed. Homemade propellants shall not be used.
3. Model rockets should be launched in areas clear of flammable materials. They should not be launched in high winds, near buildings, near power lines and trees, or under any condition which might be dangerous to people or property.
4. Model rocket launching systems should be remotely controlled and electronically operated by a switch that will return to "off" when released.
5. Model rockets should have a recovery system to prevent substantial damage to the rocket and to prevent hazards to persons and property on the ground. No attempt should be made to recover a rocket on a power line or other dangerous place.
6. At the time of launch, the wind speed should be less than 20 mph and the visibility greater than 2,000 feet.

VIEWING SOLAR ECLIPSE

1. Direct viewing of the sun, for any reason, is extremely hazardous. Indirect viewing methods of viewing sunspots, solar eclipses, etc. are the only safe methods known.
2. Sunglasses, smoked glass, exposed photographic film, and welders' goggles are not safe for watching a solar eclipse. The National Society for the Prevention of Blindness recommends viewing by projection through a pinhole to another surface as the only safe method for solar eclipse viewing.
3. Teachers and pupils should be aware of the fact that immediate pain may not accompany exposure of the eyes to harmful radiation. The absence of pain cannot be used as an indication that the level of radiation is safe.
4. Direct viewing of infrared and ultraviolet sources should be avoided at all times.

EARTH SCIENCE SAFETY QUIZ

The instrument on the following pages is offered as a model only. The teacher should perform all of the laboratory activities required of the pupils. The test for his/her classes should be written to cover the safety rules that would be in force for these activities and field trips.

EARTH SCIENCE SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

Describe the safety precautions and safety equipment, if needed, for these activities:

1. Fracturing a rock. _____

2. Heating a substance in a test tube. _____

3. Performing the acid test on rocks and minerals. _____

4. Cleaning up a spilled chemical. _____

5. Taking a written test. _____

6. Carrying specimen bottles on a field trip. _____

7. Carrying acid on a field trip. _____

8. Using a telescope for making daytime observations. _____

9. Evaporating the water out of a salt solution over a bunsen burner.

10. Drinking out of a container used for laboratory activities.

PHYSICS SAFETY QUIZ

The following questions are offered as suggestions for a safety quiz at the beginning of the course. The objective in using discussion questions is to help the pupil formulate some ideas concerning the prevention of accidents and emergency actions to be followed in case of accidents. The answers to the questions should receive a thorough class discussion following the test.

PHYSICS SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

-
1. If a person is making an electrical hookup with many components and electrical leads, what should be the last connection to be made.

 2. Give the closest location of each of the following items that might be needed in an emergency situation in a physics laboratory.
 - A. fire extinguisher _____
 - B. breaker box to control the 120 volt AC supply to the lab stations

 - C. telephone _____
 - D. eyewash station _____
 - E. fire exits _____
 - F. fire alarm box _____
 3. Explain a safe method for observing a solar eclipse.
 - A. By naked eye observation. _____

 - B. With a telescope. _____

 4. If a person is using a piece of electronic equipment and finds that it gives him/her a tingling sensation when it is touched, what should the person do? _____

5. What should the pupil do if he/she has some electrical apparatus that needs to have some connections made, and he/she not fully understand the correct procedure. _____
6. What precautions should be taken before the pupil uses a laser in an experiment? _____
7. If two people were doing an experiment to investigate centripetal force by whirling a stopper in a horizontal plane over the head, and the string broke just when it was in the position shown in the drawing, can one show (by using another arrow) the direction the object will take when it goes flying off in space? Demonstrate by drawing another arrow.



8. If one receives an injury in the physics lab, what person should be notified first? _____

CHEMISTRY SAFETY QUIZ

NAME _____

CLASS _____

DATE _____ GRADE _____

Multiple Choice

- _____ 1. A pupil has just spilled acid down his/her leg. The first thing to be done is to:
- A. notify the teacher.
 - B. neutralize it with the proper chemical.
 - C. fill beakers with water and rinse it thoroughly.
 - D. use the shower and rinse well.
- _____ 2. A person has just made and fire polished a right angle bend and wants to insert it into a rubber stopper. The first thing that should be done is to:
- A. hold it near the base and twist it in.
 - B. lubricate it with water or glycerol.
 - C. place a hand over the bend for leverage and push it in.
 - D. wait for one's partner and have him/her do it.
- _____ 3. One partner has just splashed a solution of sodium hydroxide into his/her eye; the other partner should:
- A. quickly get help from the teacher.
 - B. make up the appropriate antedote while the person rinses his/her eyes.
 - C. guide the partner to the nearest eye wash station and help him/her flood the eyes with water.
 - D. use the shower.
- _____ 4. A small test tube of methanol has spilled and ignited at a station, one should:
- A. pour water on it.
 - B. notify the teacher.
 - C. smother it with a glass plate.
 - D. remove from the station anything that will burn.

- _____ 5. The substance to use to neutralize an acid burn is:
- A. five percent acetic acid.
 - B. water only.
 - C. a moist paste or solution of sodium bicarbonate.
 - D. a dilute solution of base-like sodium hydroxide.
- _____ 6. The antedotes in the lab for acid or base burn will be located:
- A. at the first aid station.
 - B. wherever they are kept by the teacher.
 - C. in the fume hood.
 - D. on the desk where lab materials are dispensed.
- _____ 7. The neutralizing substance for alkali (base) is:
- A. five percent solution of acetic acid (vinegar).
 - B. water only.
 - C. a moist pack of sodium bicarbonate.
 - D. none of these.
- _____ 8. To stop the bleeding of a severe cut one should:
- A. apply pressure.
 - B. get the teacher.
 - C. use a "Band Aid."
 - D. flood it with water.
- _____ 9. A person has lighted the bunsen burner and it "strikes back." He/she should:
- A. turn off the gas at the desk valve.
 - B. push the burner in the sink.
 - C. step away from the station.
 - D. get the teacher.
- _____ 10. After dealing with a laboratory accident to the best of his/her ability, a person should:
- A. continue with the experiment.
 - B. notify the teacher.
 - C. clean up the station and plan to make up the experiment at another time.
 - D. try to switch lab partners.

- ____ 11. Goggles must be worn in the laboratory:
- A. whenever anyone is working with chemicals or heating.
 - B. whenever chemicals are at any lab station.
 - C. whenever one is actually pouring chemical solutions or heating.
 - D. during all of the above.
- ____ 12. The first thing to do whenever a chemical solution comes in contact with the skin is:
- A. call for the teacher.
 - B. find the appropriate antidote.
 - C. rinse thoroughly with water.
 - D. wipe the skin with a paper towel.
- ____ 13. In the laboratory-it is safe to apply direct heat to:
- A. glassware, as well as porcelain, evaporating dishes and crucibles.
 - B. glassware imprinted with "Kimax" or "Pyrex" only.
 - C. plastic containers.
 - D. glassware stamped "Kimax" or "Pyrex" and porcelain evaporating dishes and crucibles.
- ____ 14. When heating a test tube directly in a flame, the pupil should:
- A. slant it slightly and move it slowly through the flame.
 - B. hold it very still in a vertical position so it does not point at anyone.
 - C. use a boiling chip.
 - D. point it at one's lab partner so no other will be endangered.
- ____ 15. Solutions used to neutralize acid or base burns should be:
- A. put on all acid or base burns.
 - B. never be put in the eyes.
 - C. used before the burn is rinsed with water.
 - D. used only if blistering occurs.

____ 16. It is safe to heat organic chemicals such as hydrocarbons or alcohols:

- A. directly in a flame if the quantity is small.
- B. directly in a flame if a boiling chip is used.
- C. only in a water bath.
- D. these chemicals may never be heated.

____ 17. Glassware that has a small chip or crack:

- A. may be used in an experiment if it does not have to be heated.
- B. should be discarded immediately in the container for broken glass.
- C. may be taken home for personal use.
- D. may be saved and handed in at the end of the year.

____ 18. When diluting acids the pupil should:

- A. pour the acid into the water.
- B. pour the water into the acid.
- C. pour them at the same time into a third container.
- D. do none of the above.

____ 19. A pupil will not be permitted in the lab if:

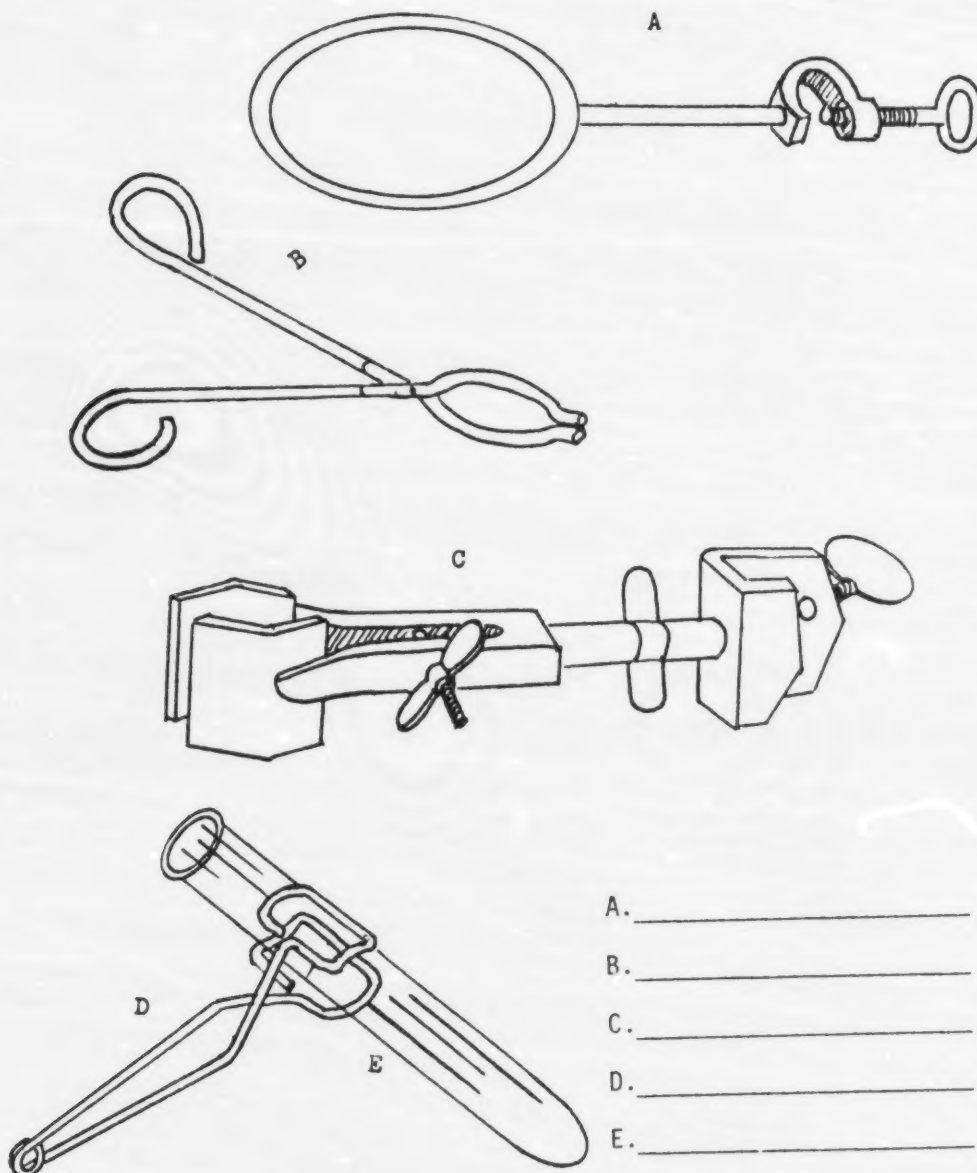
- A. he/she is dressed up for an assembly.
- B. he/she is wearing improper shoes (high heels, open toes, sandals, clogs, etc.)
- C. the person is wearing glasses.
- D. he/she is wearing an apron.

____ 20. Reagent bottles for class use should:

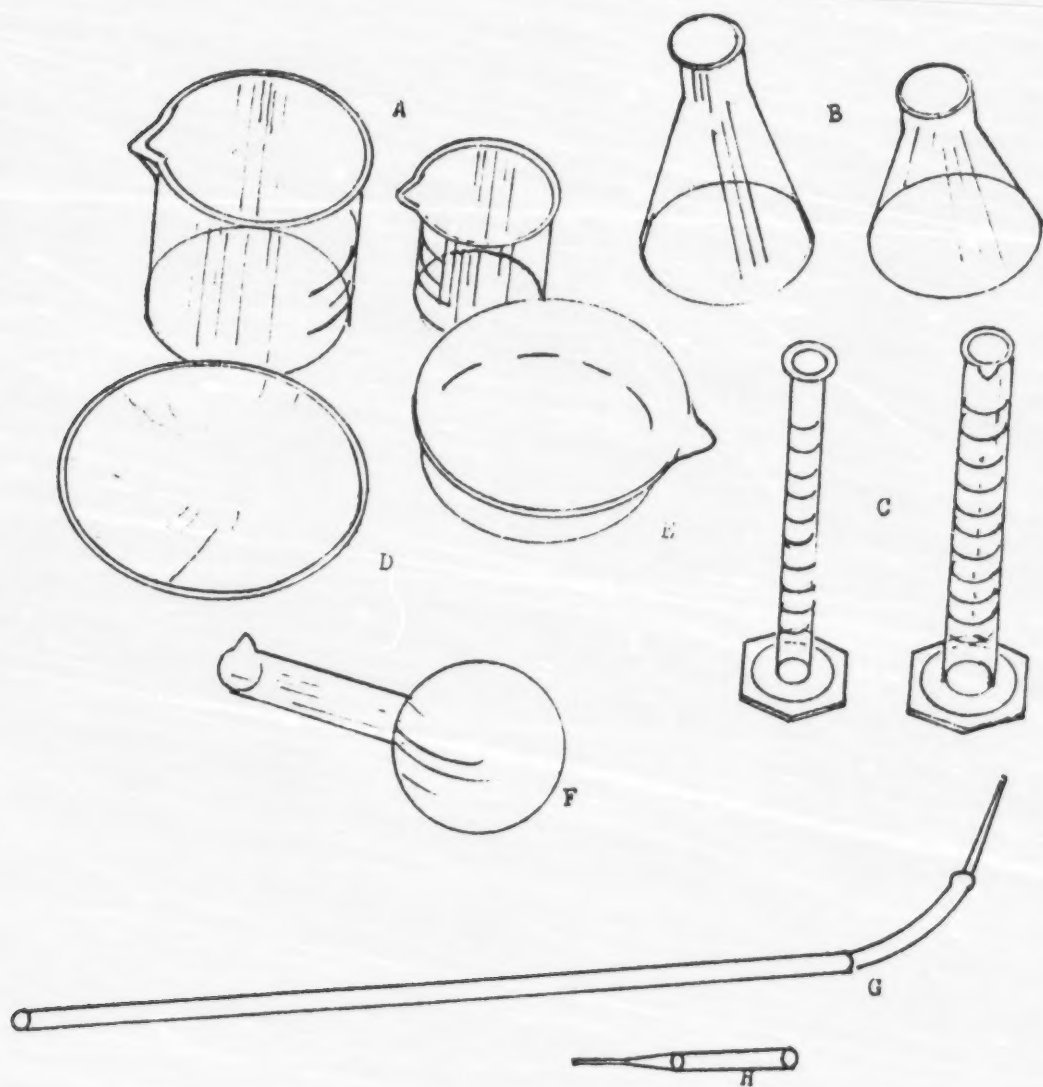
- A. never be taken to one's desk.
- B. always be taken to one's desk for his/her use and then returned.
- C. be taken to the desk occasionally if no one else wishes to use them.
- D. none of these.

CHEMISTRY QUIZ (continued)

21. In the spaces below, identify the item pictured that are used in a Chemistry Lab.

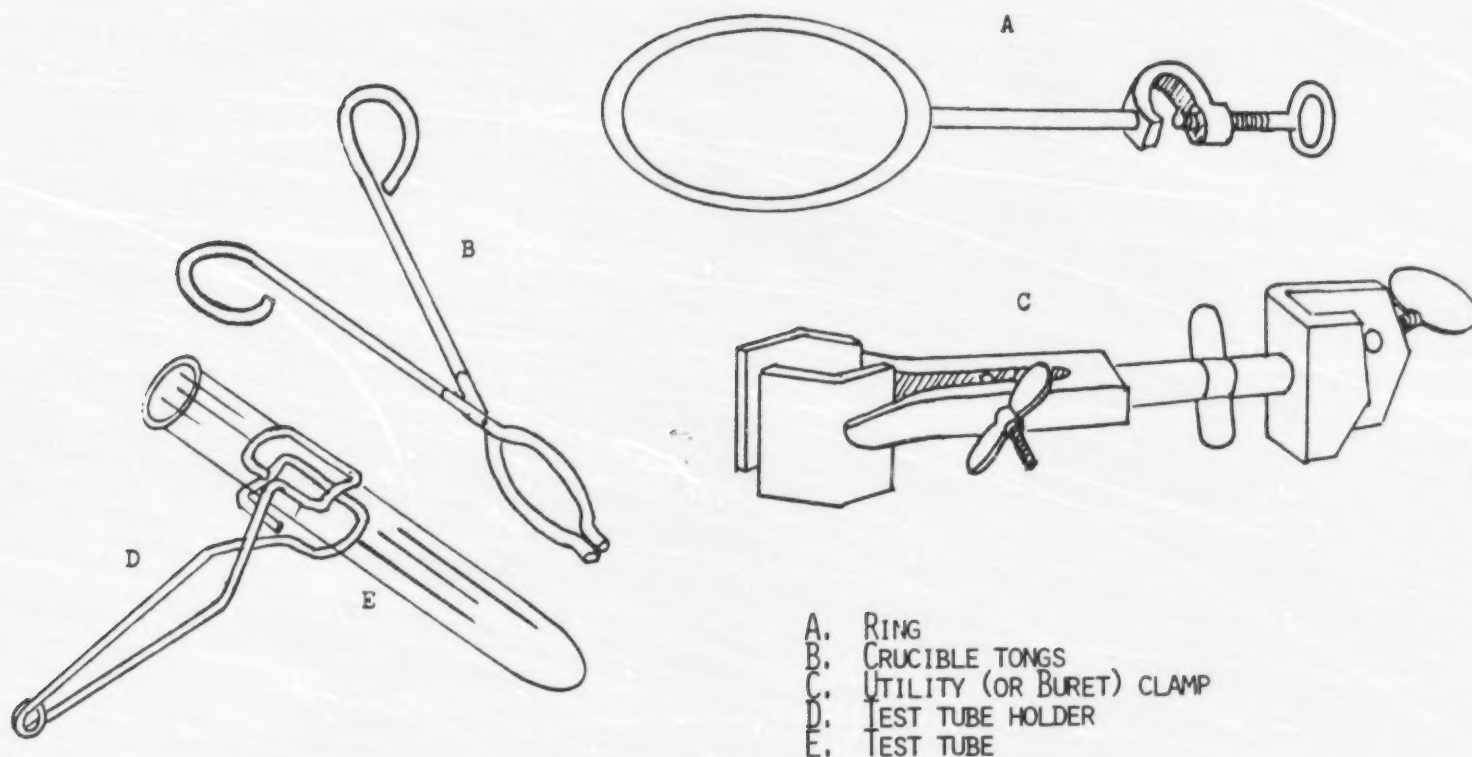


CHEMISTRY QUIZ (continued)

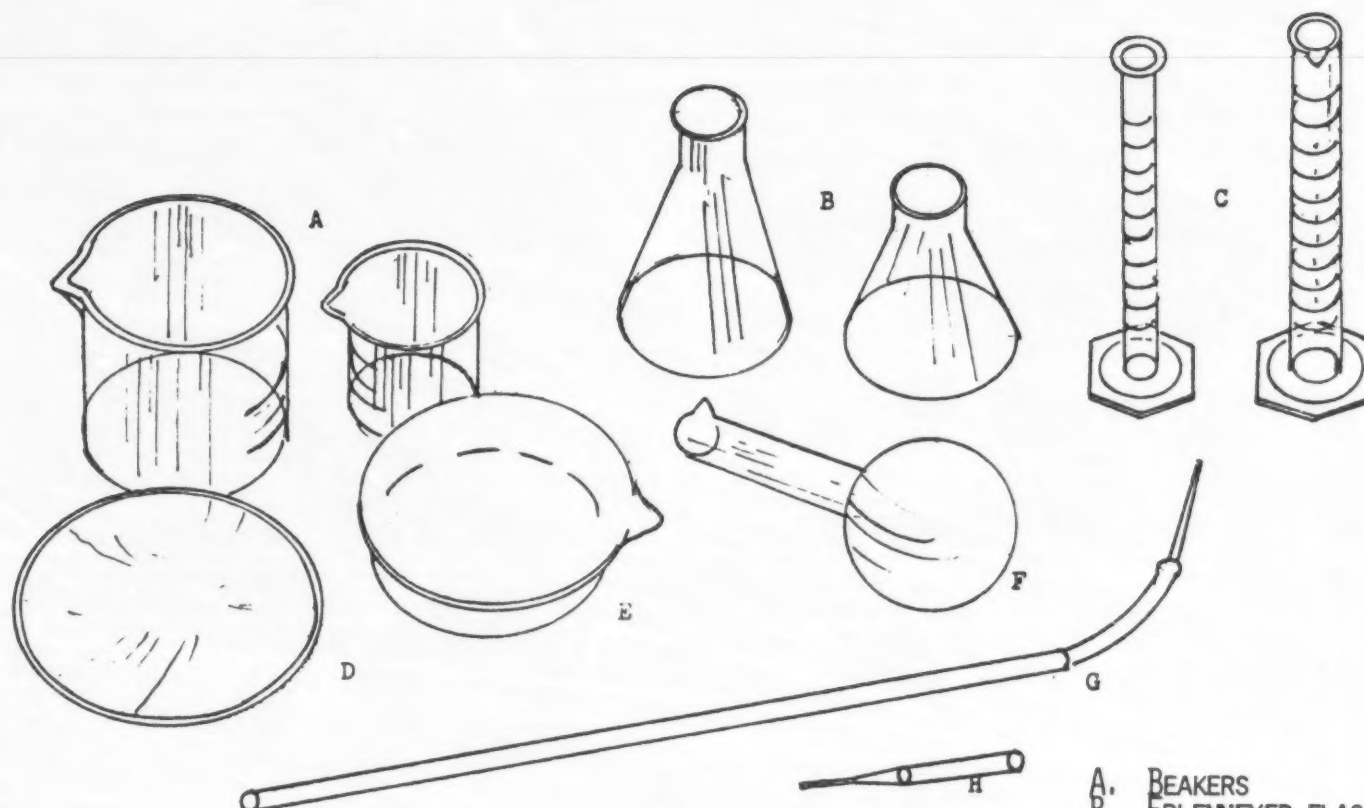


- | | |
|----------|----------|
| A. _____ | E. _____ |
| B. _____ | F. _____ |
| C. _____ | G. _____ |
| D. _____ | H. _____ |

CHEMISTRY EQUIPMENT



- A. RING
- B. CRUCIBLE TONGS
- C. UTILITY (OR BURET) CLAMP
- D. TEST TUBE HOLDER
- E. TEST TUBE



- A. BEAKERS
 B. ERLLENMEYER FLASKS
 C. GRADUATED CYLINDERS
 D. WATCH GLASS
 E. EVAPORATING DISH
 F. ROUND BOTTOM FLASK
 G. BURET
 H. MEDICINE DROPPER

REFERENCES

Materials were selected and reviewed from the following sources and in some instances were incorporated in the production of the preceding unit.

1. Disposal of Small Batches of Hazardous Waste Material. U.S. Environmental Protection Agency, 1976.
2. Division of Environment, Bureau of Environmental Sanitation, State of Kansas Department of Health and Environment, Topeka, KS. 66620
3. Fire Protection Guide on Hazardous Materials. Boston, MA: National Fire Protection Association, 1975
4. Gosselin, Robert., Harold C. Hodge, Roger P. Smith and Marion N. Gleason, Clinical Toxicology of Commercial Products. Baltimore: The Williams and Wilkins Co., 1976.
5. Laboratory Waste Disposal Manual. Washington, DC: Manufacturing Chemists Association, revised 1975.
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7. The Merck Index. Rahway, N.J., Merck and Co., Inc. 1976.
8. Safety First in Science Teaching, Division of Science, North Carolina Department of Public Instruction, Raleigh, NC., 1977.
9. Sax, N. Irving, Dangerous Properties of Industrial Materials. New York: Reinhold Book Corporation, 1968.